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Germicide by Electricity.

Two eminent French biologists, MM. Apostoli and Laguerrière, have for many years been conducting experiments with a view to testing the destructive power of the electric current on the germs and microbes which modern medical science holds accountable for most of the dread diseases that afflict humanity. If the information which reaches us of their success be correct, it would seem that electricity has a part of vast importance to play in the treatment of maladies due to the activities of the germs, bacilli and microbes, upon which physicians of all countries have lately been concentrating their attention.

MM. Apostoli and Laguerrière find that a constant current of about one-third of an ampere is sufficient to kill the anthrax bacillus and render it harmless in a very short space of time. The destructive action is due, say the experimenters, not to any heating effects of the current, but to the decomposition and liberation of gases which takes place at the positive electrode.

It certainly does not seem difficult to comprehend that if the electric current is capable of destroying the life of human beings, it ought to be able to do the same for miserable little microbes, notwithstanding their wonderful vitality in the presence of conditions capable of ending the existence of any other animate thing. But, granting that MM. Apostoli and Laguerrière have made the discovery which they claim, it appears to us that there are difficulties in the way of its practical application which will not be easily surmounted. Even though it be proved that a few hundred milliamperes are sufficient to kill the microbes, which at present defy all efforts to reach them, and bring down scores of victims daily, we do not quite see how the current is to be directed to the seat of operations when once the germs have established themselves in the system of the sufferer. There are other considerations, too, such as the pressure requisite to send one-third of an ampere through the resistance offered by the human body. If such difficulties as these should be overcome, however, electricity will revolutionize medical practice in many directions, and the hackneyed saying that "electricity is life" will have a new and powerful meaning.

Atmospheric Electricity.

This forms the fourth report presented by the author on this subject to the Electrotechnical Society of Berlin. The author's results, obtained by means of kites, show that there is a continuous rise of potential from the surface of the earth up to considerable heights, and he has found no indication of any diminution at still greater heights. He therefore inclines to Peltier's hypothesis of a negative terrestrial charge, in preference to that of Sir William Thompson, who supposes that while the earth itself is negatively charged, the higher layers of the atmosphere are charged positively. Assuming the truth of Peltier's hypothesis, he finds that, according to experiments with a cloudless sky, the electric force at the earth's surface is about 275 volts per metre.

The results obtained with an overclouded sky were too varying and complex to lead to any very definite conclusions, but the author considers that the key to these more complicated phenomena is to be found in the results obtained with a cloudless sky.

Considering the results of both series of observations in the light of the effect which Arrhenius has shown to be excited by light on the electrical conductivity of air, and of the fact observed by Hallwachs that the dissipation of negative electrification is accelerated by light to a greater extent than that of positive electrification, he considers himself justified in ascribing a high degree of probability to the following propositions:

There is a continuous radiation of negative electricity from the sun to that side of the earth exposed at the time to its action, accompanied by a radiation of negative electricity equal in amount from the earth into space.

The portions of the earth which mainly play a part in this radiation are the highest and lowest outlying parts of clouds, projecting portions of the earth itself, and small particles, such as ice needles, water drops and dust, suspended in the atmosphere.

The lower atmospheric layers, especially when charged with dust and smoke, are charged negatively, partly by direct radiation from the sun, and partly by radiation from the peaks and projections of the earth's surface, where the electric density is comparatively high.

The negatively charged earth will electrify the lower surface of each drop or ice crystal in a cloud negatively, and the upper surface positively; but in the interior of a cloud these charges will gradually be communicated from one drop to another, so that the cloud will act as a conductor, and its lower portion will be positively electrified, and its upper portion negatively.

The author then points out how, according to these suppositions, clouds may become either positively or negatively electrified as a whole. Even when the total electrification of a cloud is zero, its presence will affect measurements of potential near the earth's surface in the same way as if it were a conductor, and this will be the case to a still greater extent in the case of charged clouds, or of clouds in which the under portions are differently charged from the upper ones.

The concluding portion of the paper gives the results of a large number of galvanometric observations on the dissipating power of points, made during stormy days.—*Elektrotechnische Zeitschrift.*

Electricity not Dutiable.

The treasury department at Washington has received a letter from Col. R. D. Shaw, of Watertown, N.Y., saying he has obtained a concession for utilizing the water power on the Canadian side of the river at Niagara Falls in behalf of an American Company, and asking if electricity transmitted by cable to the American side of the Niagara river for lighting and power purposes would be subject to duty. Assistant Secretary Tichenor has informed him that the department has already decided that as electricity is an invisible, subtle agent or power, possessing no substance as a merchantable commodity, it is not liable to duty.

An Electrical Block Signal.

An audible electric signal for railroads was tested last week at the 133d street station of the Suburban Railroad, New York. The power of the apparatus is furnished by an electric battery which operates a relay in the railroad station. From this relay wires run to the railroad tracks, the joints of which are insulated with leatheroid. When one train is on a block of track protected by the contrivance and another enters, the engineer of the latter will be warned by the falling into sight of a flat iron handle painted a bright red and the simultaneous ringing of a gong. Both are parts of the signal box, which is arranged within the locomotive cab. They are operated by an electric current which is formed at the track joint along a wire, one end of which is attached to the body of the locomotive and the other to the front truck of the first car. The circuit is made as the locomotive wheels touch one rail at a magnetized point and the car wheels another. The invention is designed to be of special use in snow storms, fogs and cases of color blindness. Twenty signals will be placed on the Suburban Road.

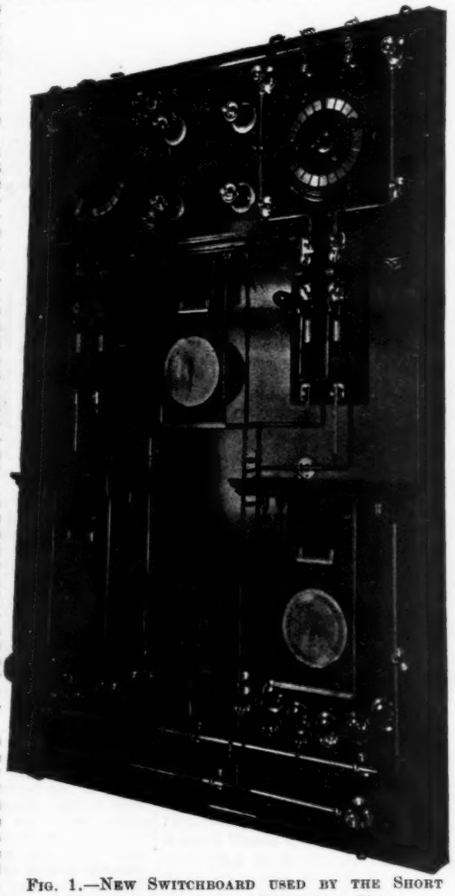

FIG. 1.—NEW SWITCHBOARD USED BY THE SHORT ELECTRIC RAILWAY, AT MUSKEGON, MICH.

The Short Electric Railway at Muskegon, Mich.

The Short Electric Railway Company, at the expiration of the time of trial, has turned the electric railway plant constructed by it in Muskegon over to the railway company. The letter of acceptance gives most hearty and unqualified endorsement of the system, and draws comparisons between the expenses and earnings of the road one year ago and now. There has been an increase of over 50 per cent. in the earnings, while one car less is in service and one is held in reserve. The plant consists of 10 miles of line, 12 motor and 6 trail cars, and two 100 horse-power generators. Several illustrations of the road appear in this issue. The perfection of the electrical machinery is shown in the ease with which cars are operated, and in the small expense for repairs. The president of the road, in speaking of this, stated that the repairs were "quite inexpensive," and that no accident or injury to apparatus had occurred. Readings, taken systematically, for a period of several days, show that the average horse-power per car during the times of heaviest travel, from 6 to 6.30 P. M., is 4.75. The Muskegon people, it is needless to say, are enthusiastic over the road, and one week after the opening the town council gave an unlimited franchise to the railway company, which they have not been slow to take advantage of. Already two extensions of the original line are about completed, and a third is under way.

Some Details in the Manipulation of Block Signals.

BY W. W. NICHOLS, SUPT. TELEGRAPH, C., B. & Q. R.R., BEFORE THE NINTH ANNUAL MEETING OF THE ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS, AT NIAGARA FALLS, N. Y., JUNE 19, 1890.

That block signals should be handled in accordance with a uniform and simple plan is almost self-evident. Uniformity and simplicity are absolutely necessary to the avoidance of a confusion which would result from complication and sooner or later seriously affect the efficacy of the system. The methods adopted in the interchange of business by the delivery of trains at various junction points have made uniformity in railroad trade signals compulsory. In the common occurrences of running trains over joint tracks, which is a condition naturally prescribing the use of a block system, if any does, how much more necessary becomes uniformity; it rather concerns the lives of many instead of a few.

The nature of block systems conduces to simplicity of arrangement, conditions under which they would be used are alike with but few unimportant variations, for which provision can easily be made. It is not that of handling trains in which may occur events quite extraordinary, often so diversified in character that set rules cannot apply, but where man must use his discretion as the occasion demands.

I had an opportunity, some time ago, to examine closely the workings of many block systems throughout the country, and was much interested in noting the wide differences in what appeared to me to be impor-

tant details in the manipulation of the signals; oftentimes a single movement on one road to indicate a certain condition, would indicate quite the opposite on another. It was the confusion which existed, and which still exists, though happily to a limited extent, in different codes of train signals, a confusion so great that in one case with which I am acquainted the adoption of the uniform code produced a fatal accident before the crews were familiar with the signals. But what surprised me more in examining the different block systems was the glaring inconsistency which appeared in one or two cases where one would hardly expect to find it. An inconsistency which, in one instance, held a man responsible for a condition and yet took away from him the knowledge upon which his responsibility depended.

An acquaintance with these different systems in their dissimilarities, an inquiry into the whys and wherefores of particulars, which generally evoked a discussion, and a knowledge of the end to be attained, led me to ponder on some details in the manipulation of block signals. Actuated by a desire to submit my views to your criticism, your patience permitting, I would now give expression to my thoughts.

To begin with, the model block system must be throughout simple, uniform and, therefore, consistent.

1. Simplicity demands that along the route of a railroad no more signals should be used than are absolutely necessary. It has been claimed that an interlocking switch signal must never be used as a block signal, even when the interlocking switch station is one with the block station, because their significance is entirely distinct; the former indicates a condition of the track alone, while the latter pertains more to the relative position of the traffic. This objection does not appear to be a serious one, as few are disposed to separate one signal from the other under these circumstances. It is quite evident that the fewer signals we have to indicate to the engine man a route, the better; that a large number of signals at any one point where high speed is desirable, tends to confusion; the mere possibility of such a condition should condemn all that leads to it.

Whether the block signal shall ever be a train order board, may on the other hand be somewhat questionable. Many roads under a firm discipline have attached such a significance to the train order board that if displayed for a train, an order must be forthcoming before the train leaves; the spacing of trains by a block signal, which is also a train order signal, must necessarily modify this significance to a considerable extent. This modification upon single track roads would undoubtedly be subject to serious objections, which can, however, be avoided in either of two ways; by giving a clearance card whenever a train is stopped by the block signal, or separate the signals completely under a specification which insists that wherever the two signals are separated, the semaphore (assuming that they shall be the standard form for all block signals) shall never be used as a train order board, nor a block station ever located at a train order station. I think that you will agree with me that the former plan is perfectly practical, simpler than the latter and just as effective.

The normal position of the block signal, when non-automatic, should be at danger. An automatic signal should show clear only when the block which it governs is clear; that a failure in the device should throw it to danger; conditions properly fulfilled in all the later forms of automatic block signals.

These specifications suggest the question regarding the proper time of raising the signal to danger, after it has indicated clear, to protect the entering train; a question which appears to be a much discussed one. Practice in this particular varies more than in any other, and reaches great extremes. Different systems throw the signal anywhere from two car lengths in front of an approaching locomotive, to two car lengths behind the departing train. When thrown in front of the engine it is assumed that it is desirable for the engine man to see the signal go to danger in order that he may know that the rear of his train is protected. As to this, all that need be said, I think, is to remind the exponent of the plan that the engine man of a train is not specially concerned with the protection of its rear. His function is distinct and pertains to the advance of the train alone, just as the protection of the rear, when occasion demands, is the train man's function; a function with which, by the way, the model system must not interfere nor in any way affect—flagging should be performed as strictly within the blocked sections as outside of it.

To raise the signal immediately behind the engine is sometimes considered necessary in order to prevent collisions between trains following each other closely under a permissive signal. In many places, converging points in large cities for instance, an absolute block except on a very elaborate and expensive scale is impracticable, consequently trains are often run in a permissive block; and although the cautionary signal warns the approaching train of the existence of another in the block ahead, nevertheless, circumstances often compel the maintenance of a comparatively high rate of speed. It frequently happens through yards that the signals can be clearly seen before the preceding train for which it is displayed has entered the block; under these circumstances it is claimed that there always exists a danger from rear end collisions because the engine man will maintain a high speed as long as he sees the clear signal on which he keeps his eyes, oblivious of the train ahead.

When a home semaphore is alone used, to throw it to danger immediately behind the engine would here seem advisable; but to use a home signal alone renders any block system woefully incomplete.

The main advantage in the use of a block system, in fact, the strong argument in its favor, is that by its means an engine man may be kept constantly posted as to the state of the route before him. Especially valuable is this in times of storms and dense fogs. But how is it possible for him to maintain a high rate of speed when an inflexible rule requires a cautious approach to every block station? He must not pass a home signal at danger. The only obviation to this difficulty is to give every home block signal a distance signal interlocked with it, so that it can indicate clear only when the home signal is clear; the interval between the home and the distance signals not to be a single standard, but to depend upon the physical conditions of the roadway and field of view.

The best arrangement of all, in my estimation, and the one for the model system, is to place the two signals at each station upon one post, the home, a red semaphore board at the top, the distance, a forked green one below the home; the green board to be the distance signal to the home of the block ahead. Under this arrangement, the system, for obvious reasons, should be an absolute block. Running under such a system, an engine man can so graduate his speed as to secure the best as well as the most economical results.

Reverting to the consideration of our question as to the proper time for throwing the home to danger, it is my firm belief that best results are only attainable when done after the entire train has passed; and the basis for my belief may be explained as follows:

Every road, as far as I know, provides for the joint responsibility of train and engine men. They have been compelled in the past to acknowledge the possibility of an engine man, affected with absent-mindedness or something akin to it, running by signals set against him; this was probably the one great cause which affected the establishment of the scheme of joint responsibility. If long experience has proven this responsibility a necessity in the case of train order boards, then in what does the block signal differ that it should be treated otherwise? Why should it require an accident to teach us the similarity in the two signals? Some railroads, under another *regime* than the one which permits the entire train to pass before throwing the signal, have had that accident or avoided it through no fault of theirs, and thereupon immediately changed their rules governing the handling of their block signals.

Now, assuming that joint responsibility, to the extent indicated above, is ordinarily indispensable to safety, how can we consistently throw the signal from clear before the train men have had opportunity to recognize the engine man's authority for entering the block? And why should not they who are concerned with the protection of the rear of the train, be the ones to see it go to danger?

In the hauling of heavy freight trains, a "break-in-two" is liable to occur at any time. This event is fraught with many dangers on account of the high speed at which freight trains are now run. If the signal is manipulated in the manner last indicated, it is possible to apply the rule in force on the Chicago, Burlington & Quincy, and which operates as follows:

As soon as the operator discovers the "break-in-two," he throws his signal to danger, which warns the train men that they are entering the block without authority, and must act accordingly; the station in advance is notified of the "break," and the operator there sets his signals as the situation in the block ahead demands; in addition, he steps out on the track and gives the "break-in-two" signal to the engine man of the parted train, who handles the forward section according to rule.

In accordance with conclusions, the model system should fulfill the following requirements:

It should be at all times and at all stations an absolute block.

It should be worked with semaphore signals, in conformance with a plan which shall give each block a distance signal, controlled by a home signal interlocked with it; the distance to be raised immediately behind the engine; the home not until the entire train has passed.

FIG. 2.—VIEW ON THE MUSKEGON ELECTRIC RAILWAY—SHORT SYSTEM.

It should, as far as possible, include all signals along the route which are used in the advance of main line trains, and, therefore, all interlocking switch stations should be incorporated into and form a part of the system.

Separate train order boards should be avoided by the employment of clearance cards.

Where the relative position of block station and passenger depot or other stopping point render it necessary, starting or advance signals should be provided to avoid running by a home signal at danger to reach the point of detention.

As the title indicates, this paper is intended merely to treat of a few principal details in the manipulation of block signals, but before closing I would like to call attention to two particulars in the general design of a block system, which are not new by any means, but which, judging from their frequent omission, are considered of little importance.

One is the position of the signal post directly over or to the right of the governed track, with semaphore blades invariably to the right of the post.

The other is applicable to interlocking switch signals, but inasmuch as our model system includes them, it can be pertinently noticed. This particular provides a plan, whereby at interlocking switch stations the home signal arms shall never be more than two in number situated on one post; the top arm everywhere to govern the through route, the bottom to indicate a diverging one. Where this post holds the distance signal for the home of the block ahead, it would be best to maintain the relative position upon the post assumed by the two signals at the standard block station, and consider the home for the diverging route an auxiliary to be placed below the two block signals.

Novel Bell Ringing System.

Capt. D. H. Wilson, of Normal, Ill., has just had patented a novel device. It is an electric transformer, and transforms a straight galvanic current from a primary battery to an alternating magneto current that will ring magneto bells and do all that a current generated by a magnetic generator will do. It consists of an induction coil, the primary of which is wound with No. 18 wire, and the secondary with No. 33. A magnetic current breaker, coarsely wound, is introduced into the circuit from the battery to the primary of the coil; also an automatic clockwork switch which, alternating every six hours, changes from one set of batteries to another, thereby resting each set in turn, which gives the batteries much longer life.

JEST FOR FUN.

"How's my credit?" inquired the storage cell, of the dynamo tender.

"Let me see—um, um—you're charged with electricity; that's all, I believe."

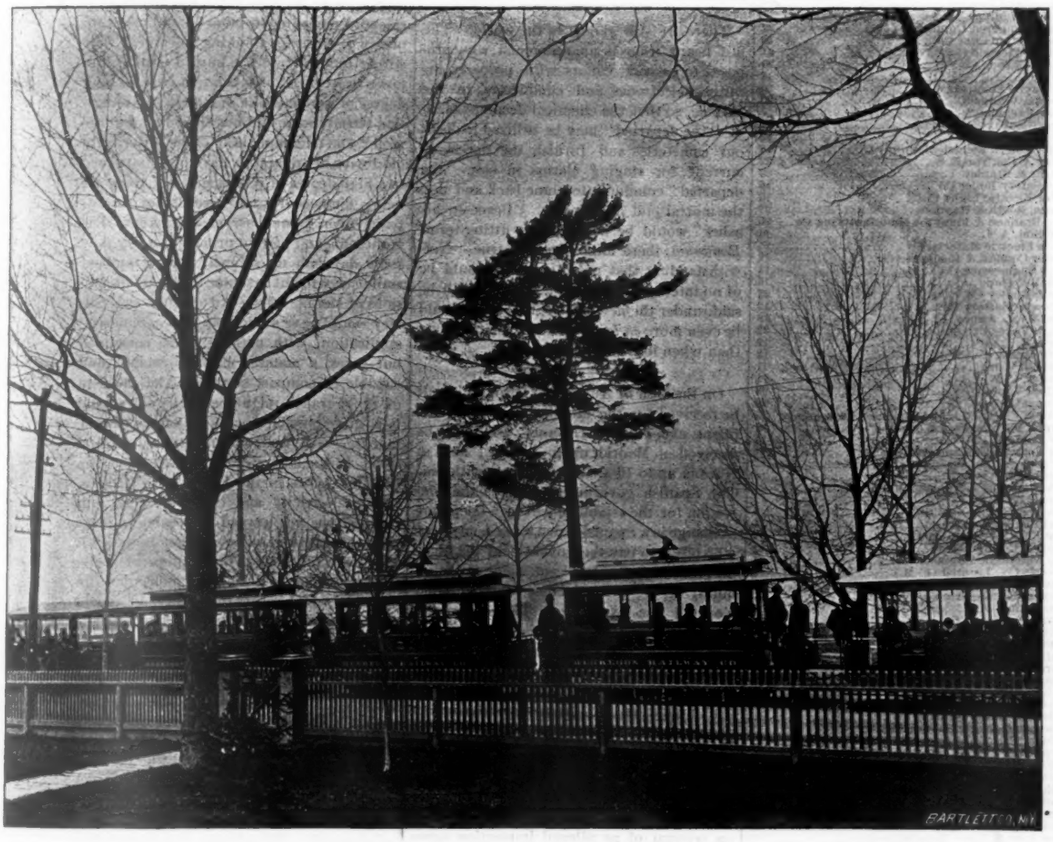

FIG. 3.—ANOTHER VIEW OF THE SAME.

Electric Light Employes.

The employés of the Municipal Electric Light & Power Company, of St. Louis, have organized a relief society known as the Municipal Electric Company's Benevolent Association. The first officers are James J. Ayres, president; Perry Parker, vice-president; J. E. Weldon, secretary; and C. W. Herg, treasurer. The object is to assist men who may be sick or get injured. The general superintendent of the company has fitted up a meeting room, which will be furnished with all daily papers and a variety of electrical literature. The association's meeting days are the first and third Sundays in each month.

Fogg—Doctor, my wife is very nervous, and she seems in a very bad state.

Doctor—Yes; her nerves are completely shattered. Have you a telephone at your house?

Fogg—We have.

Doctor—And does your wife use it much?

Fogg—Frequently.

Doctor—No wonder her nerves are unstrung. No change of air will be necessary. Just sell your telephone.—*America.*

The arc lights placed on the tower of the power house will give young couples out driving at night something to gaze at on cloudy nights.—*Kearney, Neb., Hub.*

Removal Notice.

In accordance with an agreement between the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, the headquarters of the American Institute of Electrical Engineers, on and after Monday, June 2, 1890, will be at the House of the Mechanical Engineers, 12 West Thirty-first street, near Fifth avenue. Communications and exchanges should be addressed accordingly.

The secretary's office will be in the front room on the third floor. The joint library and reading-room on the second floor. The auditorium, in which the meetings of the Institute in this city are to be held hereafter, is on the first floor.

The entire premises are being renovated, and during June the secretary's office will be temporarily located on the second floor.

Breach of Contract.

Attorneys Worden & Morris have filed a complaint in the Superior Court, at Fort Wayne, Ind., on behalf of the Fort Wayne Electric Light Company, against the Electrical Supply Company, of Ansonia, Conn., whose branch offices are in Chicago. The demand is for $8,000 damages for breach of contract, and the complaint alleges that in December, 1887, the plaintiffs ordered 500,000 carbons from the defendants. Shipment was not immediately made, and when the order was filled the price of carbons had advanced from $10 per thousand to $25 per thousand. Demand was made for the difference, but the plaintiffs refuse to pay more than the price at which carbons were quoted at the time the order was placed, hence the Fort Wayne Company enters suit, claiming damages in the sum already mentioned.

New York Telegraph Service.

The Western Union Telegraph service of New York, especially in the minor offices, is in a deplorable condition. These offices are run in a go-as-you-please way in the main by ignoramuses, who in no way represent the officials of the company, or serve the public's interests. Several of these side offices open and close at their own sweet will, and are run by light-headed young girls, incapable of comprehending the vital importance of their duties.

The uptown offices, above Fifty-ninth street, should open at 7 in the morning, to be of any service to customers in the upper part of the city. There is no system, no regularity whatever, in the management of these small offices; and the same strictures apply as well to the district messenger offices. They are run frequently by inexperienced young men, whose manners are by no means what they should be.

Reform in these offices is imperatively and immediately demanded, or the people will rise in their might and establish a service that will prove—as the existing arrangements do not—a convenient and time saving facility to the public.

This is the season of reform, and, before the political campaign opens, it is to be hoped that the officials of the Western Union will make the thorough overhauling of these small offices that is so urgently demanded. —*New York Graphic.*

Kalamazoo, Mich.—City Electric Light Company. Capital, $30,000.

Chicago, Ill.—Economy Light and Power Company, capital stock, $400,000; incorporators, W. A. McSurely, C. H. Briat and George C. Helmer.

Waukegan, Wis.—Waukegan Electric Light Company, capital $60,000. The incorporators are J. H. Detzen, E. P. Krow and Henry D. Hesse.

St. Louis, Mo.—The People's Gas and Electric Light and Power Company, capital stock, $50,000; incorporators, John Maguire, R. D. Walsh and Rolla Wells.

Webb City, Mo.—Jasper County Electric Power Company; capital, $150,000. Incorporators: O. K. Caldwell, Thomas Clohesy, of Kansas City, and W. P. Munroe.

Brooklyn, N. Y.—King's County Electric Light & Power Company. Capital, $300,000. Trustees, Mirabeau L Towns, Michael J. Quinn and James T. Lewis, of Brooklyn.

Chicago, Ill.—Pullman Electric Motor Company; to manufacture sewing machines and electric motors; capital stock, $200,000; incorporators, E. N. Talbott, H. B. Reymour and L. H. Bisbee.

Kittanning, Pa.—Kittanning Electric Light, Heat and Power Company; capital, $12,000. The directors are: R. P. Marshall, Henry J. Hays, R. A. McCullough, John L. Hinderle and H. H. Wagleman, all of Kittanning.

Rahway, N. J.—Rahway Electric Light and Power Company; capital, $50,000. The incorporators and stockholders are John B. Simonson, of New York City; Wellis P. Ayer, of Boston, Mass.; Welles C. Bryant, of Newark.

St. John, N. B.—Eastern Electric Company; capital, $150,000. The gentlemen constituting the company are Messrs. John F. Zebley, Frank W. Rennell, Wm. Wirt Hewett, Samuel W. Smith, of New York, and John D. Purdy, of St. John.

Ogden City, Utah.—Citizens' Electric Light Company; capital, $30,000. Officers: President, Fred. J. Kiesel; first vice-president, Harvey W. Smith; second vice-president, Wm. Schansenbach; secretary, Theodore Schansenbach; treasurer, John A. Boyle; superintendent, Frank C. Priestly.

Albany, N. Y.—The Central and South American Telegraph Company has filed a certificate of increase of its capital from $5,000,000 to $6,000,000. The certificate is signed by William G. Hamilton, Charles Lanier, George S. Bowdoin, Theodore G. Defobla, Jose M. Munoz and William R. Grace, as directors of the corporation.

Trenton, N. J.—The American Gas and Investment Company has been incorporated, with a capital of $50,200,000; to build, purchase and operate works for the manufacture and sale of gas and electricity for heating and lighting purposes. English capitalists are said to be backing the scheme. The charter fee of $10,040 was the largest ever received by the State.

Newark, N. J.—The Accumulator Company, with offices at Newark, New York and Philadelphia, capital stock, $5,000,000; to buy and sell all kinds of electrical apparatus and machinery. The incorporators are George E. Webb, Monroe W. Tingley, John J. Wilkinson, Joseph D. Potts, H. H. Houston, G. A. Griscom, of Philadelphia; T. N. Vail, Boston; A. G. Agnew, New York.

Pittsburgh, Pa.—Charters have been granted to the Wilkins and Braddock Street Railway Company, of Pittsburgh; capital, $6,000. The directors are: George W. Miller, John G. Boyd, James C. Duffy, Hiram K. Shichan and Robert S. Fraeler, of Pittsburgh. The Pittsburgh, Braddock and Turtle Creek Street Railway Company; capital, $30,000. The directors are the same as in the Wilkins company.

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No attention will be paid to communications for the REVIEW without the *name and address of the writer.*

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Buckeye Engine Co 14
Bunnell & Co., J. H 19
Burton Electric Co 19
Butler Hard Rubber Co 13
Cary & Moen 19
"C. & C." Electric Motor Co 17
Central Electric Co 19
Chadbourne, Haselton & Co 26
Clark Electric Co 19
Columbia National Bank 11
Dwight Slate Machine Co 19
Eddy Electric Manufacturing Co 25
Edison Lamp Co 23
Edison Machine Works 23
Edison Manufacturing Co 17
Electrical Safety Co 13
Elektron Manufacturing Co 13
Empire China Works 19
Empire City Electric Co 28
Eugene F. Phillips Electrical Works, Ltd 12
Eureka Tempered Copper Co 24
Evans Friction Cone Co 13
Excelsior Electric Co 21
Faraday Carbon Co 24
For Sale 11
Fort Wayne Electric Co 28
Freeman, Walter K 25
Garvin Machine Co 14
Gibson Gas Fixture Works 14
Gordon & Co., W. H 19
Great Western Electrical Supply Co 16
Greeley & Co., The E. S ..... 12 & 22
Hazazer & Stanley 23
Heine Safety Boiler Co 16
Heisler Electric Light Co 16
Holmes, Booth & Haydens 21
Horn, Brannen & Forsythe Manufacturing Co 25
Ide & Son, A. L 11
Illinois Electric Material Co 25
Interior Conduit & Insulation Co 18
Jarvis Engineering Co 14
Kendall & Slade 16
Lane & Bodley Co 24
Leclanche Battery Co 19
Leffel & Co., James 18
Lehigh Valley Creosoting Co 22
Lynch, E. T., Jr 19
Macfarlane & Co., Wm 19
Marshall, Wm 11
Messmer, C. W 11
Mitchell Vance Co 26
National Carbon Co 19
National Electric Light Association Proceedings 19
Newark Machine Tool Works 12
New England Butt Co 14
New York Belting and Packing Co 24
Ostrander & Co., W. R 13
Palermo Mica Co 24
Parker-Russell Mining and Manufacturing Co 24
Phœnix Glass Co 19
Phosphor-Bronze Smelting Co., Ltd 23
Pond Engineering Co 14
Pope Electric Clock Co 11
Queen & Co., James W 13
Rice Automatic Engine 14
Ricketts Co., Limited (F. M.) 12
Royce & Marean 20
Sawyer-Man Electric Co 27
Schoverling, A 16
Schuyler Electric Co 26
Seely & Taylor Manufacturing Co 23
Shultz Belting Co 14
Southern Electrical Supply Co 13
Sperry Electric Co 24
Sprague Electric Railway & Motor Co 19
St. Louis Electrical Supply Co 23
Stevens & Babcock 25
Thackara Manufacturing Co 23
Thomson-Houston Electric Co 14
Trinidad-Heimann Insulated Wire Co 19
Tropical American Telephone Co 17
United Electric Traction Co 21
Vincent & Co., Charles R 14
Wainwright Manufacturing Co 26
Walker Electric Co 18
Wanted—Electrician 11
Wanted—Electric Light Salesman 11
Washburn & Moen Manufacturing Co 24
Washington Loan & Trust Co 11
Washington Electric Conduit Co 11
Watson & Stillman 22
Western Electric Co 24
Western Power Construction Co 23
Westinghouse Electric Co 20
Whipple Co., The Fred. H 23
Williams & Potter 14
Wilson & Co., R. D 11
Wyckoff Pipe Co 19

Nearly 3,000 miles of submarine cable are shortly to be added to the telegraph system of Central and South America. The Compagnie Française des Telegraphs Sousmarins intends to extend its cables in the West Indies and the requisite cable (about 1,000 miles in length) is now being made at Henley's and will be laid by the "Westmeath," on her return from the Halifax-Bermudas expedition. In South America, the Central and South American Telegraph Company is about to prolong its line, which terminates at present at Lima, Peru, to Valparaiso, Chili, thereby competing for the West Coast traffic with the West Coast of America Telegraph Company, whose cables connect the various Chilian and Peruvian ports between Valparaiso and Lima. The Silvertown company is now manufacturing some 1,700 miles of cable for this extension, and the line is expected to be in operation by January 1st, 1891.

Invention's field never was so ready to receive and nourish the new invention as it has been and is now for the electric railway. The activity now prevalent is widespread, but can fairly be said to be only a forerunner of the giant strides which ere long will mark and measure the miles by the thousand. The age of progress is only beginning nowa-days.

The Baltimore & Ohio Railroad Company is negotiating with the owners of the system of signaling between moving locomotives, heretofore described in the REVIEW, for its use on the road between Washington and Philadelphia. If arrangements are completed, some six or eight short sections between Washington and Baltimore will be equipped with this apparatus. It is regarded as especially useful at curves, tunnels and other places where an engineer can see but a short distance ahead. On long stretches of straight track it will not be needed. It is not expected that this system will supersede any devices now in use, but that it will afford additional means of safety in running trains.

There are still ghouls in the world. The last heard from is an economist who proposes to provide coffins with properly arranged electrodes and conductors to the surface, so that the chemical decomposition of "the departed" may be utilized to light our cemeteries and furnish the necessary current for ringing alarms in case "the departed" concludes to come back and don the mortal coil once more. "Peace to his ashes" would be no longer a fitting term. *Residuum*, there might be, it is true. Notwithstanding that passing events would be of no interest to the dead, it could still be said, under the new *regime*, that they would be even more *en touche* with current matters than when in life.

On the 28th of August next proposals will be received for the establishment of a telephone exchange at Havana. Bids will be received at Madrid up to 3 P. M., and at Havana up to 10 A.M. of the day mentioned. The Spanish government awards the concession for the establishment of a telephone exchange in a Spanish town to the contractor who offers to pay the government the highest percentage (ten per cent. being the minimum) of the gross income derived from working the exchange. The concession gives a monopoly of telephonic communication, both as regards exchange and private lines, within a radius of ten kilometres of the municipal district to which it applies. The invitation for proposals referred to above offers a chance near home for enterprising American telephone men.

SURELY MISTAKEN.

The New York *World* last week contained an account of an alleged imposition upon the British scientific public by Professors Hughes & Preece. It was asserted by the correspondent that these gentlemen proclaimed that they had invented apparatus for visual telegraphy, that is to say, for transmitting a picture of an object electrically, so that a person at one end of a wire could see another at the other end, though they were miles apart; and that when a test was made, and scientists, newspaper men and everybody else present were in a white heat of enthusiasm over the brilliant success, it transpired that it was all a hoax and transmission was in reality effected by a clever arrangement of mirrors, and there was nothing electrical about it. There must be some grievous mistake here. Men such as those named do not indulge in such tomfoolery. The possibility is not remote that such transmission will be commercially practicable before long, and through the instrumentality of purely electrical agencies. We have a keen desire for further particulars of the Preece-Hughes apparatus. There are some people who are wrestling with this problem on this side of the water who will relish more news. We decline to credit the charge of imposition unless strongly substantiated. These men are not fakirs.

NO LIMIT TO ELECTRICAL PROGRESS.

As we sweep, in the swiftly flying car of industrial progress, past so many marvelous achievements in the field of electricity, and realize how prolific has been its contributions to the comfort of society, we are forced to ask the question, "Has not the ground in this art been fully worked and its fertility been taxed to its utmost limit?" But if we examine carefully the passing scene we need not ponder long to feel convinced that the end is not yet. The great mill where genius carries its grist to be sifted and ground—the Patent Office—lays its books open to the public once every week; new customers are constantly arriving and the old ones appear regularly on its pages. Occasional discoveries of latent principles, never dreamed of by the old philosophers, show that even in its scientific aspect this art is in its infancy, and every find of this kind opens up a new realm of exploration by being harnessed to bits of metal and made to perform useful work. It requires no prophet to foresee that "still there's more to follow." Electricity is a splendid vineyard to labor in and offers up plenty of room for thinking workmen. The strong tendency of the human mind to follow a beaten path has brought about a high degree of perfection in methods of application already mapped out. The dynamo, the motor, the telegraph, and other generically old forms of apparatus, have been improved to a high degree of refinement, but there are many chances for an investigator in by-paths over ground as yet unbroken. The frolicsome and malign primary battery may some day bob up serenely with a lambent smile that will put to shame the proud pretensions of storage cells. An efficient gas battery would have a wide range of commercial application, with nothing to be consumed but gases, a material light in weight and capable of compact storage. The problem of rapid transit might be neatly solved and it is quite possible that the dynamo-electric machine will find a competitor for local uses. In the laboratory of Nature, one combination exists in the generation of atmospheric electricity and cloud-charging, but no man has yet learned the secret so as to copy the action. May it not be possible that the physical disintegration of water into vapor creates an intermolecular disturbance which rouses the mysterious agent? It would seem as if the twin sisters, heat and electricity, do not yoke well together. One always sneaks out of the back door when the other enters the front. One makes the place too warm to hold the other. In the action of thermal batteries, electricity is put to rout by the entering heat, and even in primary batteries the same little personal idiosyncrasy is dominant, for heat is developed by combustion of the active electrode; on the other hand, when a sportive current of electricity glides like a fleet-footed Mercury into a conductor, heat immediately vacates the premises. These phenomena are sign boards on a promising by-path, and one, as yet, very slightly explored; thermal batteries are full of promise. The day is not far distant when the glory of the telephone will be eclipsed by visual telegraphy. A few foot-prints have already been made in this path. The end is not inaccessible, and when it shall have been reached, many of us will be surprised that we did not see it ourselves. Freight transmission is another path full of promise; perhaps by the time of the World's Fair, Chicago can ask New York for a loan of a V and be accommodated the same afternoon. With a straight overhead rail and enough current, 200 miles an hour is within the range of possibility.

The scope of electrical accomplishment widens every day. What seems like the present horizon is only an apparent limit; as we move on, the margin will keep constantly shifting like the junction of earth and sky, and both in science and industrial art the coming generation will find the vista of the future as bright with promise as that of the past is rich in gifts.

The St. Louis *Republic*, founded in 1808, celebrated its ninety-second anniversary on June 16th, by issuing a 40-page paper. This journal has enjoyed a very strong and steady growth since its passage into new hands, about two years ago.

CORRESPONDENCE.

Electrical Happenings in Boston, Cincinnati and St. Louis.

OUR BOSTON LETTER.

Mr. David W. Dunn, formerly of this city, and now connected with the Pittsburgh agency of the Thomson-Houston Electric Company, was a visitor at this office early in the week.

Mr. E. B. Gawthrop, of the firm of Hughes & Gawthrop, electricians and contractors, Pittsburgh, Pa., was in Boston this week on business connected with the Pittsburgh agency of the Thomson-Houston Electric Company.

Jewell Belting Company has just closed a large contract for belting up the new machinery recently purchased by the Caledonia Carpet Mills, Philadelphia, and which required very large and heavy oak belts.

The National Electric Manufacturing Company, of Milford, Conn., will soon be settled in its large and commodious factory, where it will commence the manufacture of electric light supplies and a variety of electrical goods.

Electric Belt Line, at East Lynn, Mass.—The *Press* of that town contains the following: Workmen were busy yesterday putting in the cross connection of the road with the tracks connecting the Thomson-Houston Company with the Lynn and Boston Railroad. It is thought that there will be no doubt of the construction of the branch line up Walnut street this Fall. People in Saugus desire the construction of this line from Birch Brook by Pranker's mill to the center and on to Cliftondale.

Proposed Electric Railway plans are well under way, and articles of agreement are nearly ready for signature for a new electric railway company, which proposes to build and operate an electric street railway from Attleboro to the Rhode Island line, and ultimately enter the city of Pawtucket. The scheme is backed by well-known business men. The proposed line will run from Attleboro to Dodgeville, thence to Hebronville and Lebanon to the State line. This event will open up a large tract of valuable land between the two points.

The Bermuda Cable.—Advices from Halifax, N. S., dated July 3, report as follows: It was stated here yesterday that the cable to Bermuda had been completed, but Manager Budge of the Halifax telegraph office, says some days must elapse before the cable is in operation. The cable is laid to the coast of Bermuda, and a message stating this fact was received from the steamer "Westmeath," at 5 P. M. on Monday. The work of laying the shore end is somewhat difficult, as it must pass over some reefs, and Manager Budge says the work has not yet been accomplished, and that communication has not been established with Hamilton.

The Bristols Manufacturing Company, of Waterbury, Conn., will soon break ground for the foundations of its proposed new factory; which, when completed, will more than double its present manufacturing facilities.

The Thomson-Houston Electric Company is reported to have purchased a controling interest in the Middleboro Gas and Electric Company, of Middleboro, Mass.

The Walworth Manufacturing Company, of this city, is said to have leased a large factory at Pittsburgh, Pa., formerly occupied by the Continental Tube Works. This extensive addition to the Walworth Company's manufacturing facilities will enable that enterprising corporation to keep pace with the rapidly increasing demand for the "Walworth" iron poles for electric light and electric railway purposes.

The Electrical Industries at the "Hub" have enjoyed a more active and a healthier trade during the present month than at any other time since the beginning of the year.

Electric Motors of all makes are becoming more and more popular every day. The demand for these almost invaluable and indispensable machines—particularly among the manufacturing interests of this section—is steadily increasing.

Electric Stocks.—Boston quotations, at closing hour of the Exchange, Thursday, July 3, were as follows:

Thomson-Houston Electric Co.	55½.
" " Preferred.	96.
" " Series C.	13.
" " Series D.	7¼.
Thomson Electric Welding Co	230.
" European Welding Co.	106.
Westinghouse Electric Co.	40.
Fort Wayne Electric Co.	14.
Eastern Electric Cable Co.	67½.
" " preferred.	51½.
Gethins Electrical Manufacturing Co.	2¾.
Union Electric Car Co.	5.
Electrical Safety Co.	1½.
Western Union.	84⅞.
TELEPHONE:	
American Bell.	229.
Erie.	49.
New England.	54.
Mexican.	1.
Tropical American.	1.50

Boston, July 5, 1890. W. I. B.

OUR CINCINNATI LETTER.

Linemen Still Wear Climbers in Cincinnati, and they have plenty of poles to climb. Telegraph poles of many eras and administrations; telephone poles towering over the buildings and carrying wires too many to be counted; electric light poles apparently shoved half their length into the earth by the weight of wire they bear; street railway poles of wood and of iron, and of many styles. All these and many more going up. The principal duty of the policemen seems to be to stop traffic, keep the crowds away and give the pole setters a fair chance. Underground construction is unknown, the most anxious office-seeker disdains to be a subway commissioner, and no particular opposition to overhead wires has yet developed. The Queen City's high culture in matters artistic does not require the painting of telegraph poles.

One Disputed Question has been settled here. It is, that it is perfectly feasible to construct and successfully operate overhead railway lines through crowded, busy, crooked streets and over heavy grades. More than that, numerous systems of propulsion are used on the same track. On a portion of one road there are now running four horse car lines, one cable line and one single trolley electric line, while a double trolley line is being constructed and will soon be in operation in the same place. Some very ingenious devices have been arranged for the electric wire turn outs and crosses, and it is claimed that all difficulties in this matter have been overcome. A large part of the consolidated railways is being changed from horse power to electric power.

The Lines are Nearly Completed on the following routes:

From Post Office to Avondale	8 miles.
" " " Cumminsville	12 "
" " *via.* Mt. Adams and Eden Park Inclined Plane, to the end of Gilbert Avenue	8 "
East and West End Road from the head of Elm street to Columbia	30 "

All of these are equipped with the Thomson-Houston double trolley system. Two sections of the road operated by this system are already in full operation, and are working very successfully. The Brighton driving station is to be enlarged by the addition of two 80 horse-power dynamos, making six in all. A contract has just been made for the erection of a new driving station at Avondale, to be completed in 60 days. This station will be provided with two 500 horse-power Lane & Bodley's Corliss engines and nine 80 horse-power dynamos. The company now has 14 cars running and has ordered 47 more. President Kilgore is pushing the work with his characteristic energy and sagacity, aided by the efficient service of the company's mechanical engineer Mr. B. L. Baldwin, and the Thomson-Houston superintendent, Elmer P. Morris. The use of the double trolley line was decided upon by the railway company, partly for the purpose of avoiding interference with telephone lines, or other existing lines, and more particularly for the reason that the company, after carefully investigating the subject, concluded that, in its case, the cost of constructing and operating the double trolley system would be less than for the single trolley line with a ground return wire. In estimating the cost of building a single trolley line, the expense of repairing pavements was included. On one of the lines referred to, the cars will pass under a bridge with only 14 inches head room and special trolley-poles have been devised, which will work in that space. On the 2d inst., the Cincinnati Court rendered a decision in the case of the Telephone Company against the Sprague Inclined Plane Railway, allowing the road to defer changing its line from the single to the double trolley system until next October and forbidding it to make any extensions of its present system. The road has a considerable extension of its lines already built and is enlarging its power station to provide for two additional Edison dynamos of 100 horse-power each. In addition to the above mentioned lines all the roads in Covington are about ready to send their mules out to the blue-grass pastures of their native land and run their cars by electric power. The Short double trolley system is to be used. The lines are all up except on the Suspension bridge, where some delay has been caused by questions relating to right of way. The Covington line crosses into Cincinnati and terminates at the Post Office. For some distance the cars of this line and those of one of the Thomson-Houston lines will run over the same track and will use the same wires. As both systems are worked on a 500 volt current, this can easily be done. The Covington line is using some poles made of four angle irons and two iron plates riveted together. These form a pole about three inches thick and ten inches wide at the ground line, tapering to the top. They have great strength to resist the strain of the suspending wires, but not very much in the other direction.

There is one electric lighting company in Cincinnati and his name is Hickenlooper. General Hickenlooper is the president and active manager of the gas company, and he had the good sense, which some gas companies seem to lack, to see that electric illumination had come to stay, and that warfare wouldn't be profitable. The policy which his convictions shaped has made him master of the situation, and the great confusion in methods of constructing and operating the numerous plants which had grown up in the city, and in prices charged for lights, is being generally cleared away. The business is being put on a good working basis under a plan which will avoid any conflict between gas and electric interests, and important advance in the latter may be looked for. Special power circuits are also being constructed to meet the increasing demand for current for small motors. The company is using the Fort Wayne, Fuller-Wood arc lights and the Slattery incandescent system, and Edison dynamos for power purposes. The Queen City Lighting Company has not joined the consolidation and continues an independent business.

It Sounds Strange to say that a great city like this, with numerous lighting stations and wires on every street, has never had any public lights, but such is the fact. The municipal government is conservative and deceptive and slow to adopt new things, especially when it is attached to old customs.

The Westinghouse Company has established an agency here, and is installing a good many lights.

The North American Construction Company, of which W. H. Jacobs is the superintendent, is installing a good many small plants in the neighborhood. One of these plants, of 30 arc lights, operated by a 40 light alternating current dynamo, was started at the Zoological Gardens a few days ago. The lights were first turned on at half past eight o'clock one evening, after the animals had quietly settled themselves for a good night's sleep. When the electric brilliancy flashed out, the bears and the gorillas rolled over, rubbed their eyes, apparently feeling quite ashamed of themselves for having overslept; the fowls fluttered and cackled, and in half an hour the whole menagerie was in full tide of daytime frolic. The next night, the animals were not so prompt in rousing, and on the third night they gave a quiet wink as much as to say "we tumble to your trick," and went to sleep again.

The Card Electric Motor Company is being reorganized, and is preparing to do a more extensive business in manufacturing small motors.

Mr. E. P. Morris expects to sever his connection with the Thomson-Houston Company shortly, and give his entire time to the business of the Novelty Supply Company, of which he is the president. That company has increased its capital stock to $300,000, and will soon move to larger quarters. Its special business will be to manufacture and sell supplies for electric railways. It furnishes a large number of very useful devices, some of them invented by Mr. Morris. A description of these will be given in the company's advertisement, which may be looked for at any time.

If Any Enterprising electrical inventor has a process for purifying sewage, he ought to come to this city immediately and try his invention on the semi-fluid mixture, ironically called water, which is being pumped out of the Ohio river for the people to drink.

At the Western Union Telegraph Office, Supt. I. N. Miller and his assistants are struggling with the difficult task of handling the enormous mass of business which is steadily increasing. This is one of the places where Western Union operators were most certain that the telephone would destroy their business, but their opinions have been modified by ten years' experience.

Capt. Geo. N. Stone, general manager of the Telephone Company, preserves his rotundity and serenity, and is conducting the affairs of the company with such ability and success that capitalists are patroling the streets trying to buy the stock at 50 per cent. premium. It pays regular dividends of seven per cent. Capt. Stone is maintaining a steady opposition to the interference with the working of his wires by the single trolley railway circuits, and is much gratified with the recent decision of the courts already referred to.

The City has Recently expended many millions of dollars in laying good pavements, and there is strong objection in having them torn up. G. C. M.

Cincinnati, O., July 7, 1890.

OUR ST. LOUIS LETTER.

The Brush Electric Company has asked the courts for an injunction against the Municipal Electric Light Company, restraining them from the use of the Wood lamp, which the Brush people claim is an infringement against their patents. The injunction has not as yet been granted, so that the city is not deprived of its lighting.

The Latest Move in Street Railway Circles toward electric motive power is the application of Mr. Robert McCulloch, general manager of the Holmes Street Railway Syndicate, to the city council for permission to change to the overhead electric system the Cass Avenue, Northern Central and Union Railways. This move has long been contemplated, but this is the first action taken in the matter. Engineers are now at work drafting the plans, and as soon as the desired permission is obtained, work will be begun at once.

With the Sale of the Central and Western Railway property to a syndicate, a bill was introduced in the council granting an electric overhead system to the proposed western extension. This will be another addition to the electric railways in this city.

The Union Depot Line is not so grand a success as it was first credited to be. Frequent stops are made on nearly every trip. This may be due to want of sufficient power from the central station. St. Louisans are now waiting to see what the success of the Sprague motor on the Lindell Railway Line will be.

The City of St. Charles has accepted the electric light plant for the city's illumination, and is now considering the advisability of erecting a commercial plant.

Articles of Incorporation were lately made out to the People's Gas and Electric Light and Power Company, of St. Louis. Capital, $50,000. Incorporators: John Maguire, R. D. Walsh and Rolla Wells.

The Board of Public Improvement have found out that the accommodation for the city's lighting by the electric lamp is inadequate in many portions of the city by the present arrangement, and is constantly ordering more lamps. The latest order calls for 183 additional lamps for the West End, and 50 additional along the river front.

June 30, 1890. W. H. B.

The Epstein Method of Forming Storage Battery Plates.

The object aimed at in this method is to form the plates of a storage cell with greater rapidity than hitherto, without diminishing their durability or capacity, says the London *Electrician*. Lead plates of any shape suitable for use as electrodes are put into water rendered acidulated by the addition of about one per cent. of nitric acid. The plates are kept from coming in contact with each other, and the water is always kept up to the boiling point, the boiling being continued till the lead has assumed a dull grey appearance. The plates are then taken out of the water and dried in the air. This treatment produces a greyish yellow deposit of lead compounds which has the appearance of mildew. This deposit adheres very firmly, and is insoluble in the electrolyte used for the subsequent treatment in dilute sulphuric acid. In addition it has a great capacity for taking up the gases engendered in the formation process, so that the latter may proceed quickly, without the necessity of reversing the current. It is these "raw" plates, as they are called, from which the positives as well as the negatives are formed. In order to form positive electrodes, a number of raw electrodes forming a group are put into the electrolyte, together with positive electrodes, that have to be transformed into negative electrodes. The raw electrodes that have to be formed into positive electrodes are then connected with the positive pole, and the intervening plates with the negative pole of a dynamo or battery. In the process of forming positive electrodes, the former greyish yellow color of the raw electrodes changes into a deep dark brown, almost bluish black hue, and the process is completed as soon as the electrodes have assumed that color, and an abundant development of oxygen takes place. The oxygen of the peroxide of lead produced on the positive electrodes which are to be reduced to negatives is absorbed by the effect of the electric current, and the bodies are reduced on their surface to porous metallic lead. The process of forming negative electrodes is finished when the deep dark brown or bluish black color of the positive electrodes used for the purpose has changed into a bluish grey hue, and an abundant development of hydrogen takes place. A few hours only are necessary to form a plate by this method, and the reversing of the current is unnecessary, so that in a very short space of time a great number of positive as well as of negative electrodes can be produced.

Telephonic News

*** A cablegram from Tokio states that a phonograph made by Edison expressly for the Mikado and presented to him last week by Edison's representative, has been set up in the Mikado's palace, and the monarch is delighted with it.

*** It is not too soon to commence the preparation of papers to be read at the next meeting of the National Telephone Exchange Association. Members of the association are earnestly requested to send such papers to Secretary Barney, 510 West Twenty-third street, New York City, by the first of August, if possible, so that the Executive Committee may have sufficient time to examine them.

*** During the Yale-Harvard boat race, at New London, last week, the Southern New England Telephone Company had instruments and men stationed at each mile of the course and the positions of the crews were telephoned to the local office, where they were received by Superintendent Baker, and transmitted to the main office in New Haven, where the result was bulletined by means of flags on the roof of the building.

*** The Erie Telephone Company's large increase of subscribers for the past five months, aggregating 541, indicates a proportionate increase in net earnings, which not only ensures the four per cent. per annum dividend, but also will enable the company materially to add to its $70,000 surplus each quarter. The June quarter will show the largest net earnings since the company was organized, in 1883. To this favorable condition is attributed the steady advance in the price of the company's stock. The trio of telephone stocks—Bell, New England and Erie—have shown marked strength and steady improvement this year. Bell has advanced from 199½ to 240 this year; New England from 49 to 54, and Erie from 37 to 49.

*** The next annual meeting of the Telephone Association will be held at the Russell House, Detroit, Mich., commencing on Tuesday, September 9th, next. It is expected that the business of the association will be concluded in two days, but Secretary Barney has received a hint that it will be advisable for the delegates to make their plans so as to remain in Detroit until Thursday evening at least. The Russell House is conducted on the American plan. The rates are $3, $3.50, $4 and $4.50 per day, according to location and accommodations desired. It is requested that members of the association intending to be present at the meeting, engage their rooms at an early date, so that the most desirable locations may be secured. Messrs. W. A. Jackson and F. A. Forbes, of the Telephone and Telegraph Construction Company, of Detroit, have kindly consented to act as a committee on quarters, and a note addressed to either of them will receive prompt attention.

The Tropical American Telephone Company.

The annual meeting of the Tropical American Telephone Company, Limited, will be held Wednesday, July 30, at Long Branch, N. J. The book will close July 1. Mr. Jas. H. Howard, general manager, expects that the net earnings the past year will equal four per cent. on par, or 10 per cent. on $4 per share.

It starts out with an order for 500 complete sets of instruments for one sub-company, an order of 100 sets for a second and 300 sets for a third, besides a large order for Brazil. There has been acquired, to be turned over to the Tropical Company, July 1, control of the Williams annunciator drop, patented April 8, 1890, used in all small exchange switchboards. This will enable the company to manufacture its own switchboards and levy a royalty on all drops of the above pattern used in the United States.

Train Despatching: Its Uses and Abuses.

BY G. C. KINSMAN, SUPERINTENDENT TELEGRAPH, WABASH RAILROAD COMPANY, BEFORE THE NINTH ANNUAL MEETING OF THE ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS, NIAGARA FALLS, N. Y., JUNE 19, 1890.

It is customary now, as it was 20 years ago, to consider the train despatcher a proper target at which to fire all sorts of complaints regarding the movement of trains.

My first office was near a fuel station on a Western road. There were but three regular freight trains each way upon the time table, although from 10 to 15 were usually run. All engines burned wood, and to "wood up" required from 15 minutes to several hours, depending somewhat upon the disposition of the men, the help at hand, and the number of trains in the way.

Freights, and, occasionally, passenger trains were delayed hour after hour at my station, and I was an enforced listener to all sorts of uncomplimentary remarks about the train despatcher on duty, and train despatching in general, many arguments and improved methods being advanced by the train crews during these frequent hours of waiting.

One bright fellow advanced time orders, and was thereafter the subject of ridicule, it not having occurred to these men that the schedule was nothing more nor less than a time order to each train named upon it.

My sympathies were all with the despatchers, but later on, when I was given a freight train, I joined the others in heaping abuse upon them. It happened, however, that I was soon made a despatcher, and had to take my own medicine. One week's work took all of the conceit out of me, and I asked to be returned to the road. About this time authority was given to use time orders in moving freights against passenger trains, but the second order resulted in a collision, the freight being met upon the main track, 20 minutes after the time had expired.

The despatcher would have been dismissed, had it not been for the fact that the superintendent was considered more guilty. The press denounced the officials who had so little sense as to permit such orders, and the officers of connecting roads who were interviewed were not less emphatic in their censure.

It is hardly necessary for me to say that we have out-grown the old systems and prejudices, as a boy out-grows his clothes; we have not only discovered that time orders are safe, but that they are absolutely necessary. We have the uniform system of rules and forms for moving trains by telegraph, adopted by the General Time Convention, and endorsed by more than two-thirds of all the railway milcage of the United States, though, strange to say, some who voted for this system have failed to put it into practice.

In this country we run to extremes. The matter of moving trains by telegraph has been discussed from the Atlantic to the Pacific, without cessation, until many of our best men are growing to believe that there is no other way to get trains over the road promptly, and are placing their sole dependence upon it, to the utter neglect of more important methods. Let me say here that, while no important single track railroad (and this paper is not intended to apply to any other) could at this time move a large traffic successfully without train despatchers, their work is greatly over-done, and the tendency is to still further increase it.

On many roads, freight trains are started from terminals at any and all hours, with little regard for the time table, and the train despatchers expected to get them over the road promptly and safely. Regular trains are held at terminal and way stations for all sorts of trivial reasons, necessitating many train orders, and other delays, and the officials fume, because of late trains, blockades and other accidents.

Some officials seem never to learn that about the only source of revenue to a railroad is that part of its property which moves on wheels, and that it is, therefore, of vital importance that they be kept turning. To do this there must be system, and that system lived up to every hour in the day and every day in the year. Eternal vigilance is the price of good service in the matter of moving trains, but in addition to this, two things are necessary, first, make a time table that trains can run by, then run the trains by it.

Many will argue that this can be done only where the volume of traffic is moderate and regular, and where there is an abundance of power. These are the officials, who, when a rush of business overtakes them, fill their yards and passing tracks with surplus loads, start trains from all points whenever they can be gotten ready, without any regard for the time tables; keep their crews on the road 20 hours out of 24, and abuse the despatchers because the trains are laid out.

A good despatcher is a valuable acquisition to any railroad, but it is not in the power of any set of despatchers to succeed under the circumstances just named; they may work and worry, and incur risks which make them gray, but at the end of the month, it will be found that although every nerve has been strained, the average time made by trains has been slow, and that the greatest increase has been in the pay-roll and the accident account. The latter must necessarily increase, as the men are overworked, and as system and order decrease.

A time table which has been carefully checked by the proper officials before being printed, and by hundreds of employés afterwards, must be more reliable than a telegraphic order in any event, and especially so, when the latter is handled in great haste and often by inexperienced operators.

We must therefore assume that with every special order we incur an additional risk; it has been stated by those who have studied the records, that 70 per cent. of the collisions in this country happen to trains moving on special orders, and although I have no means of knowing, I do not doubt it, for I do not know how it can be otherwise.

The greater the volume of business, the more need of moving trains on schedule time. There is no wisdom in saying it can't be done, it can. If the schedule is wrong, change it; if power is limited, shorten the time as much as safety will permit. Train men like to start on time, and their families like to know when they will be home. System will secure competent and reliable men, the opposite will drive them away. To more forcibly illustrate the point I have sought to make, I will present a few figures prepared from the records of the company which I have the honor to represent.

During the month of January, 1885, under our former system of train orders, and which, I may add, was in all essential respects, similar to the uniform system now in use, the freight train mileage was 611,928, passenger train 311,399, total 923,327 train miles; the number of train orders issued by the despatchers was 55,720; average speed of freight trains, nine miles per hour; average speed of passenger trains, 25 miles per hour.

During January, 1890, the freight train mileage was 696,421, passenger train 382,106, total 1,078,527 train miles; the number of train orders issued by the despatchers, 17,285; average speed of freight trains, 13 miles per hour, and of passenger trains, 29 miles per hour.

In the former case, 40 per cent. of the regular trains were late; in the latter, less than 10 per cent.

This statement covers 1,921 miles of road, the same lines in each case. It is but proper for me to state, however, that this improvement is not all due to the fact that we are running our trains by the time table. The physical condition of the property is much better than it was in 1885; there was no surplus power then, nor is there now, nor has there been in the aggregate any considerable increase in the side track or terminal facilities. It is particularly noticeable, however, that system and regularity in everything has developed a painstaking care on the part of the train men which makes accidents rare.

In the matter of educating our despatchers, we are sadly deficient; we put a bright operator into a despatcher's office for a short time as assistant, then place him in charge of a division; the chances are that he knows nothing about the operation of an engine; and of the track, the grades, curves, sidings, water tanks, etc., he has practically no knowledge, nor of the hundred and one duties of a freight conductor or brakeman. It is not surprising, then, that under such circumstances, train men have not the greatest respect and admiration for despatchers, who must sometimes necessarily issue instructions which are absurd.

Before going to work as despatcher, he should run over the division at least a month as brakeman on a freight train, and instead of having three despatchers working eight hours each, I would have four, and every fourth week one of them should run a freight train upon his division.

They would thus be at all times familiar with everything on the road, and the change would give them back the health and energy which constant confinement has taken away. Such an arrangement need not increase the expense, but it would add to the revenue.

I should like to say a few words concerning the uniform system of train orders adopted by the Time Convention, and now in effect upon many large roads. Every road, so far as I can learn, which has taken it up squarely and lived up to it, is satisfied, and would not go back to the former system. Upon other roads (let us hope the number is small) this system has been adopted, but not enforced. These, doubtless, regret that they made the change.

It may be natural for us to think we could improve their system, but the general managers know more than their subordinates, and I had rather profit by their wisdom, than buck my head against a stone wall. Some officials have adopted this system, and folded their hands, expecting great results. They might with equal confidence, expect a sewing machine of itself to make a pair of trousers.

The principal criticisms which I have heard are that the system is slow and cumbersome, and that there is too much red tape about it. Despatchers are, as a rule, anxious to avoid even the slightest delay, and their zeal is apt to outrun their foresight, and induce them to give too many orders. It is well, therefore, if the system is cumbersome enough to prevent this, and if the official who is using the old system (or neglecting the new) would disguise himself and see how his orders are being handled on the road, he would wish for tape of a still brighter hue.

It may be slow, but with it we have moved more than 1,000 cars per day (in addition to 30 regular passenger trains) over a crooked single track road, every day in the month, without any serious delays or complaints from the despatchers.

There are some peculiarities in the wording of the various forms which make it difficult for the despatcher to remember, and for which there is no apparent necessity; for instance:

Form B—Example 2:

"No. 4 will run ahead of No. 6 from Bengal to Madras."

Form C—Example 1:

"No. 1 has right of track against No. 2, Mecca to Mirbat."

The word "From" appears in one order, and is left out of the next; the same thing occurs in Forms E and F. This is very confusing to the despatchers, and we had a great deal of annoyance for a while on account of the word "From" being left out when it should appear, and put in where it should have been left out. With this exception, we have no occasion for finding fault with the system.

In conclusion, the train despatcher should not be considered as superior to the time table, but as subservient to it, and we must carry out this principle in order to maintain the most efficient service.

Pulp by Electricity.

Pulp manufacturers are deeply interested in an electrical method of reducing the wood in the manufacture of pulp. By this process it is claimed that the fibre is manufactured so cheaply that the entire pulp business will be revolutionized, and the digesters now in use be driven out. Kelner, of Germany, has been experimenting for several years with electricity in this direction, and has now succeeded in perfecting the process. A patent has been applied for in the United States.

Good Insulation.

The Interior Conduit and Insulation Company are now making carload shipments daily of tube throughout the country. The new underground tube seems to have met with a great deal of satisfaction. This company has a contract for furnishing the underground conduits for St. Paul and Minneapolis, and they have also sold several thousand feet to the Pennsylvania Railroad Company for their underground work. They have made quite a shipment to Japan on orders received from there, and will probably make a shipment to Germany during the coming week. The company's new and commodious quarters now enable them to turn out tubes in large quantities, although they have not, as yet, succeeded in catching up with the orders, but it is probable that this will be done before the middle of the coming month, as their output has been increased tenfold. The initial job of this company, the Shoreham apartment house, Washington, D.C., owned by the Hon. L. P. Morton, has now been in operation about eight months, and has given no trouble since the plant was turned over to the purchaser. That it is an unqualified success is evidenced by the fact that Mr. Morton is now preparing to build an extension to the Shoreham House, and it is specified by the architects that the tubing be used throughout the entire new building.

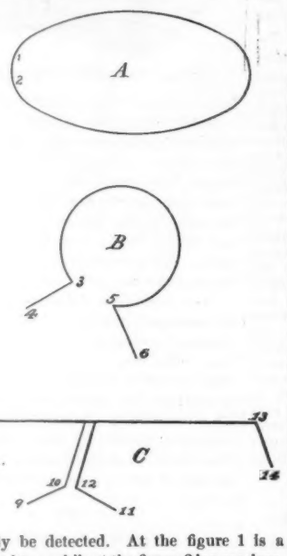
Diamond Cut Diamond.

CAPTURE OF TELEGRAPH WIRE TAPPERS IN SAN FRANCISCO.

The pool sellers of San Francisco have been victimized by wire tappers for some time past. The police have recently captured the tappers, one of whom was Nagle, a discharged Western Union operator. The gang secured a room in a building just across a little alley from a large pool room. Here their operations were carried on. The names of winning horses at the tracks here, in the East, were held by the tappers just long enough to enable one of their number to hustle into the pool rooms and place good stiff bets. The message was then forwarded to the pool rooms, and the tickets on the winning horses cashed.

The method of tapping the wires will be made plain with the assistance of our illustrations.

The cut marked A is a metallic circuit. A message sent over it makes an entire circuit, and any interruption would imme-



diately be detected. At the figure 1 is a transmitter, while at the figure 2 is a receiver. As the message is sent over the transmitter, almost simultaneously it completes the circuit, and answers back on the receiver. Thus, if a metallic circuit were tapped, the receiver would be dumb, and the operator would know at once that something was wrong.

Cut B is almost the same in its operation as the "metallic circuit." The open space in the circle is intended to represent the home office. Figures 4 and 6 show where the current runs into the ground, while 3 and 5 represent the receiver and transmitter. Any attempt to tap this wire would be immediately detected in the home office, just the same as in the case of the "metallic circuit."

Cut C shows a straight telegraph line, the message received at 7 and ending at 13. Figures 8 and 14 show where the spent electrical force disappears into the ground. This kind of wire can easily be tapped, as is shown in the cut. In the center the main wire is divided, and two other wires attached to the ends. A receiver and transmitter are affixed at 10 and 12, and at 9 and 11 the current escapes into the ground. The message can thus be received at 10 without 13 being any the wiser. A delay of 10 minutes can easily be made, and then the message sent on to 13 after the bet has been placed in the pool rooms on the winning horse. It took the conspirators a long time to figure the above matter out. They had to study over it, and it was only when Nagle was taken into the combination that they saw daylight. The latter knew the ins and outs of the Western Union system, and to him they looked for success.

Before they attempted wire-tapping, they hired a room adjoining the Western Union operating room. They discovered the key to the cipher in which the bookmakers had all the racing information telegraphed. They tried to get the young lady in the rooms of the Western Union to "stand in" with them, but she refused point blank.

Superintendent Jaynes, of the Western Union, while well pleased with the capture, could not withhold his admiration of the ingenuity displayed by the men.

"This is by a long way the cleverest scheme I ever heard of. This man Nagle is a discharged employé. He was found out giving away secrets about two years ago. After his discharge he met some men and introduced a scheme to tap the wires, but we soon found them out. They bothered us again a good deal afterward by interfering with our wires, and to prevent this the metallic circuit was introduced. We fondly believed that this could not be tampered with without our immediately becoming aware. We were wrong, I find, to-day. This device would have proved satisfactory, and we would not have been any the wiser. In the office we have a galvanometer that tells the slightest change in the current of the pool room belt of wires. We expected that the moment the wires were tapped or interfered with in the slightest, our machine would have given the alarm. So it would, had not the tappers taken precautions. This machine," said the superintendent, pointing to a compensating resistance machine, found in Fallon's room, "would have prevented us knowing when the wires were interfered with. The apparatus was invented by the men specially for this purpose, and it is the most ingenious business I have seen yet. The circuit I speak of only supplied five pool rooms, and no other messages were sent on it."

The Country Telegraph Operator.

A country telegraph operator is generally one of the most obliging people in the world, if he is treated as he deserves. But it cannot be truthfully said that they are all endowed generously with brains, or if they are, they are so seldom called upon to use them that they get out of the habit of thinking, and so lose "the knack of it." A man went into a telegraph office at a station in New Jersey, only a few miles from Jersey City, says the N. Y. *Tribune*, and told the operator that he wanted to send an important message. "I am afraid I can't take it for you," was the reply. "There is a dispatch here now ahead of yours, but I have lost my wire and this thing has been lying here for six hours." "Well," said the other, "why don't you put the message on a train? Give it to one of the men and in 15 minutes it will be in Jersey City, where it will be sent. Twenty-eight trains a day run through here to Jersey City." The operator looked with undisguised admiration at a man who could do so much thinking in so short a time. He was not offended at the new fangled city notion, but adopted the suggestion forthwith.

There is always a look of grieved surprise on the face of the man in the little country telegraph office when a busy New Yorker comes briskly in and asks him sharply if he can "send a message to New York." Of course, he can. He sends one or two every day. When the New York newspaper man rushes in late at night, however, and asks the question, the telegrapher sometimes finds that he has overestimated his ability as a "sender." As soon as he announces in the affirmative, the other jerks out: "All right. I want to send 5,000 words. Have 3,000 written, and will send you the rest as fast as I can write it." A smile of the feeble and sickly kind flits across the operator's face. "It's pretty late," he suggests, doubtfully. "Yes, but rush it right through and you can make it." Then the monotonous click of the wonderful little instrument begins. There are jerks and pauses and occasional repetitions, and now and then a sharp probe from the veteran and skillful city telegrapher at the other end of the wire. The other 2,000 words are almost written when with a quick snap the instrument ceases to send its silent song. Its manipulator gets up and says discouragingly: "It's no use; we can't make it." He looks desperate. "How many words have you got off? 2,000?" The operator looks amazed. "No, only 000." That settles it. The message is hacked and pruned and trimmed, and after a terrific struggle, 900 words go through. And yet the man has done his best. Only he has not sent 5,000 words in almost as many hours for the continuous time before that night, and stiff and untempered fingers refuse to do the unusual task.

GENERAL NOTES.

The Wilmington, Del., City Electric Company have doubled their capacity on the Westinghouse circuit. This new circuit will be for commercial use.

The LaSalle, Ill., Electric Street Railway Company claim that they will have cars running by the first of August. Their power house is nearly completed.

Efforts are being made by San Francisco capitalists to secure an electric motor franchise at Centralia, Wash. It is expected the city will be lighted by electricity within three weeks.

Gross earnings of the Edison Electric Illuminating Company, of Boston, for four months ending April 30, 1890, were about $167,000; operating expenses, $102,000; net earnings, $65,000.

The Citizens' Street Railroad Company, of Indianapolis, Ind., proposes to double the capacity of the electric line. Another 250 horse-power generator will be put in the power house.

Stephen Dahl, of Pittsburgh, claims to have invented a storage battery that is cheaper and less objectionable, by reason of weight and bulk, than those now in use. The battery is now undergoing tests.

In the action of the Brush-Swan Electric Light Company, of New England, against the Brush Electric Company, of New York, Judge Coxe, of the United States Circuit Court, granted an order denying the motion of the stay of proceedings asked for by the defendants, and vacating the temporary stay that had been granted until a hearing could be had.

A workman, while fitting electric lighting wires in the attic of an antiquated building in Salem, Va., a few days ago, came upon the souvenirs of the different stages of progress through which the inmates had passed. He found a very antique oil lamp—also a set of old-fashioned tin candle moulds—then a section of a gas pipe, while he was supplanting all these with the electric wires.

The electric headlight recently placed on one of the passenger engines of the Columbus, Hocking Valley & Toledo Railroad, has attracted considerable attention on the Toledo division. Engineer Humphreys says that on his last trip there were people collected at points all along the line. Men were perched on the fences at every road crossing, and there were crowds at every station.—*Ohio State Journal.*

The zeal of the Washington policemen in arresting electric line men seems to increase in inverse ratio to their authority in the premises. Last week one of these knights of the buttons and club discovered a man in the employ of Burket & Company, inside of a private house putting up an electric fan which was to be connected with some outside wires already up and working. The officer forced his way into the house and arrested the man. When the case came before the police court it was promptly dismissed. Actions for false arrest are liable to follow a repetition of such abuse of authority.

F. A. Gilbert, president of the Boston Electric Lighting Company, appeared indifferent as to the Governor's veto of the gas bill, when seen by a Boston *Globe* representative, one day last week. "We never had anything to do with engineering it," he said, "and only watched it enough to see that nothing was introduced in connection with it that would be detrimental to our interests." "What might have been gained if the bill had passed?" "Smaller companies outside Boston might have been able to unite and be run more economically, but I fail to see how the large companies of Boston would have gained in the least. The only possible saving that might have been made would have been in the matter of fuel. If the gas and electric plants were together, the coke left from the manufacture of gas might have been used for fuel by the electric company, without carting. But that, small as it is, is the only point in which I can see how any benefit might have been derived by consolidation."

TELEGRAPHIC

.... The French and British postal authorities are arranging for a new cable between Paris and London.

.... A new transmitter motor for use in the Gold & Stock Telegraph Company, of Boston, has recently been designed by Mr. W. H. Clausen, electrician of the company, and is now running successfully on their cotton circuit. This motor is running on 40 milliamperes, and is doing the same work which formerly required 2,000 milliamperes. The new motor is saving 98 per cent. of the former power used, and will only cost the company a nominal sum.

.... Work on the lines of the Postal Telegraph and Cable Company, between Birmingham and Meridian, Ala., through the country, is being pushed rapidly at both ends. The line will be through not only to Meridian but to New Orleans in a very short time. Immense forces of men are engaged in the work, and the poles and wires are going up rapidly. The Postal Telegraph is also building into Chattanooga from Rome, and will go thence to Cincinnati *via* Nashville, thus completing a good Southern circuit. A bitter fight is on between the Postal and Western Union, at Chattanooga. It is reported that when the Postal is firmly established all over the South, a reduction of telegraph rates will take place.

To Make Electricity the Motive Power.

The Coney Island and Brooklyn Railroad Company has applied to the State Railroad Commission for permission to change its motive power from steam to electricity. The hearing on the application of the Buffalo Street Railroad Company for a change of motive power in Niagara street, from horse to electricity, was continued at Albany before the Railroad Commission. The counsel for the opposition endeavored to show that consent of the requisite number of the abutting property owners had not been obtained. This argument was founded on the fact that the consent of the Park Commissioners, who control the park system of the city, had not been obtained. The railroad company asserts that it has the right to change its power, as the consent of the city, which owns the park, has been obtained. The hearing was further adjourned.

Death to Insect Life.

A press despatch from Albany to the New York *Sun* states that Prof. Lintner, State Entomologist, has made a microscopic examination of the insect collections of a single electric light, and estimates that the débris which he inspected represented 33,000 insects. As many of the smaller forms of insect life probably constituted the larger portion of those attracted to destruction by the light, he believes that the average number of insects destroyed in a night by a single electric light, at nearly 100,000.

The larger portion of Prof. Lintner's specimen collection from one light consisted of minute gnats, midges, crane flies and similar small two-winged insects. No mosquitoes were discovered among the victims, as they are not attracted to the lights. There were, however, large numbers of plant bugs, which are injurious to vegetation, particularly of one small species of a handsome green gassid, which feeds upon our grasses. A number of the moths, and one of the leaf rollers which have made such havoc in our fruit trees this season, were found, as well as other species of the same family. Prof. Lintner, in speaking of his examination, said:

"I was sorry to see quite a number of the beautiful gauze wings among the heaps of the slain, as their larvæ are the aphis lions, which aid in keeping down phides or plant lice."

"The electric light," to quote Prof. Lintner, "will undoubtedly prove an active agent in the reduction of insect pests, and also furnish entomologists with many rare specimens and with many species never before seen."

An Electro-Medical Dry Battery Apparatus.

Our illustration on page 10 shows a new and neat medical battery, just gotten up by Bunnell & Co., of this city. For doctor or patient, at the office, at home or traveling, this electro-medical apparatus is one of the most convenient and reliable of any of the hundreds of forms ever introduced. It is reliable because with its dry battery so much less care is necessary to avoid getting it out of order than is required with any other known form. The entire absence of acids, liquids or salts, will be appreciated by any one who has ever had occasion to use a medical battery. The box when closed up may lie in any position on a table or shelf, or in the bottom of a carriage, or packed in a trunk, without harm.

The strength of the various currents ranges from those which are so mild as to be scarcely perceptible, to the most powerful that can be endured by a strong man.

The appliances furnished with the apparatus consist of foot-plate, sponge, cords and handles (electrodes). The electrode having a wooden handle is used as a sponge-holder when required. The sponge is held by it by pressing into the hollow tube of the electrode the spring wire clamp which passes through the sponge.

The small switch at the left-hand end of the base is turned to the left to put the battery in operation. When this is done, if the spring at the left-hand end of the coil does not readily vibrate, give a slight impulse with the finger, and it will continue to vibrate with the power of the battery, if the screw is turned to its proper position. This can be ascertained by turning it forward or back. Always keep the box closed when not actually using the apparatus. The small switch is set so that it must disconnect the battery in order to close the box.

If for any reason it is desired to take out the battery, this can be readily done by loosening the screws which clamp its poles to the flat upright pieces, and springing back the clamping piece at the other end of the battery. In returning the battery to its position, notice that the carbon pole belongs and fits to the flat upright at the back of the base, and the zinc pole fits the upright nearest to you.

New Installation of the Westinghouse Electric Company.

The Brush Electric Light Company, of Baltimore, Md., having again been awarded the contract for lighting the city, in spite of the strongest opposition on the part of other local companies, is now obliged to increase the capacity of its central station apparatus. A contract for alternating current machinery for 3,000 lights was made with the Westinghouse Electric Company, a few days ago. This makes the Baltimore plant one of the largest alternating current central stations in the country.

One of the latest towns in New York State in which the Westinghouse alternating apparatus has been introduced is Tonawanda. The plant has a capacity of 500 incandescent lamps.

The Westinghouse Electric Company is installing alternate current apparatus for a central station plant of electric lighting in Carrolton, Mo. The plant will have a capacity of 500 lights,

The beautiful little town with the romantic name of Crystal Falls, Mich., is about ready for a large sized boom. The first visible sign of its march to progress is the establishment of a central station plant for electric lighting, for which the Westinghouse Electric Company has received the contract to furnish alternating current apparatus of a capacity of 750 lights.

The Westinghouse Illuminating Company, of Schenectady, N. Y., has been making considerable improvement in the central station plant of alternate current electric lighting. A new arc light machine of the Westinghouse alternate current arc light system has lately been added to the capacity of the plant.

The Westinghouse Electric Company reports the following orders received during the month of June for alternate current central station apparatus: Moundsville, Va., 500; Valdosta, Ga., 500; Newark, N. J., increase, 1,500; Cleburne, Tex., 500; Newport, R. I., increase, 500; Hamilton, O., 500; Tacoma, Wash., increase, 1,500; Vinton, Iowa, 500; Hiawatha, Kansas, 500; Saginaw, Mich., 750; Tonawanda, N. Y., 500; Philadelphia, Pa., 750; Crystal Falls, Mich., 750; Oconto, Wis., increase, 750; Ogden, Utah, 1,500; Baltimore, Md., increase, 3,000.

Arc lighting apparatus of the new Westinghouse arc light system was sold for central station purposes, in the following towns: Valdosta, Ga., 40; Ogden, Utah, 80; Schenectady, N. Y., 60; Rockville, Indiana. During the month a large arc light plant was also ordered for the Zoological gardens at Cincinnati.

New Style of Lamp Hanger.

The Great Western Electric Supply Company, of Chicago, are placing upon the market many novelties in the electrical line, and are making a specialty of central station supplies. One of the articles recently brought out by them is a pulley for hanging arc lamps, which possesses some novel features. It is arranged so that by means of a very simple mechanism in the housing of the pulley, the weight of the lamp is sustained by the ports of the pulley, and, therefore, the strain is all taken off from hoisting rope. A glance at the accompanying cuts will show plainly the method of operation. Fig. 1 shows the position of the parts when

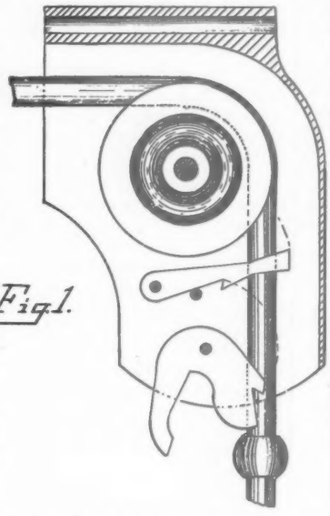


Fig. 1.

the lamp is raised to nearly its proper elevation. Now, if the lamp be raised a short distance further, the knob upon the rope will engage the nearest end of swinging pawl, both ends of which are bifurcated. This pawl is thus revolved upon its axis, bringing the other end beneath the knob on the rope; it is there securely held in position by the upper pawl, as shown in Fig. 2. When in this position, the lamp is held suspended, and the hoisting rope is relieved of all strain. There is, therefore, no danger of the lamp falling into the street through the breaking of the rope. To release the mechanism in order to lower the lamp, the lamp is slightly raised until the knob on the rope engages the end of the upper pawl, as shown in Fig. 3, which is thereby raised enough to release the lower pawl which swings downward allowing the lamp to be lowered. The whole operation of locking and releasing is controlled by the hoisting rope, and no auxiliary cord is required. There is certainly a large field for an article of this kind.

Mr. Charles A. Hamilton, of Bridgeport, has been appointed treasurer, during the temporary absence and illness of Col. Fred. A. Mason, of the Bridgeport Brass Company.

Friction Overcome.

Probably everybody knows that the body of a car is attached to each truck by a king bolt or linch pin, which allows the truck to turn in such a manner as to readily round the curves that abound on all railroads, while the long car maintains its rigidity. The king bolt passes through a circular center plate of iron or steel bolted to the under side of the car body and resting upon a similar plate attached to the center of the truck. These plates sustain nearly the entire weight of the car, though a crescent-shaped plate of steel near the side of the truck partially relieves the weight when rounding a curve. It will readily be understood that these plates must necessarily sustain an immense friction, and it frequently happens that with heavy cars this friction is so great as to prevent the trucks running easily, especially when rounding a curve at a high rate of speed, and the result is that the truck jumps the track and the train is wrecked. Mechanics and inventors have tried for years to produce something that would relieve this friction, and thus allow the truck to turn easily and quickly. Mr. L. M. Jewett, No. 8 Exchange Place, Boston, seems to have solved the problem at last, and, like all good inventions, it is done so simply and cheaply that the wonder is it was not accomplished before. The movement of a plain roller between two plates is one of absolute freedom, and this fact is taken advantage of by Mr. Jewett. He places between the upper and lower center plates a dozen or more tapering rollers, which are kept in place by an ingenious, yet simple device, whose sole duty is to keep the rolls in perfect alignment radiating from the king bolt. Two or three similar rolls are placed between the upper and lower side bearings or curve plates, and are provided with a simple but effective style of gearing which retains them in proper position, but allows an absolutely free movement. The Jewett Supply Company, of Boston, is the owner of the patents, and the device is being tested upon some of the steam roads of Boston; it is also being put upon the long electric cars which the West End road is about to introduce in that city, and, with the sharp curves of the street railway, the invention will be pretty thoroughly tested.

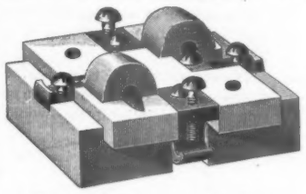
The Polarization of Electrodes.

The maximum polarization which metallic plates acquire when plunged in an electrolyte, varies with the temperature; when silver wires are used, the variation is very regular, and tends towards zero as the temperature approaches that of the decomposition of the salt. M. L. Poincaré has investigated this matter by changing the nature of the electrolyte on the one hand and on the other by using electrodes of different metals. With different electrolytes it is stated that the polarization of the silver is *nil* at the temperature of decomposition. In substituting wires of gold or iron for those of silver, the polarization has not the same regularity, but the final result is the same. It is, therefore, concluded, from the experiments of M. Poincaré, that the polarization of electrodes is *nil* at the temperature of the decomposition of the electrolyte.—*London Electrical Engineer.*

A New Branch Cut-Out.

Among the many specialties which that enterprising new firm, the Great Western Electric Supply Company, is putting on the market, is a branch cut-out with a number of novel features. As to describe it is to review the qualities to be possessed by a first-class fusible cut-out, it may seem strange that it is so different from those now in use.

The cut shows the Cutter branch cut out complete, it consisting of a peculiarly shaped porcelain base and four brass connecting pieces. The brass pieces are set into recesses in the porcelain, two of them clamping a reduced section of the porcelain, and all four being firmly held by single screws from below. These screws go in far enough to admit a thick insulating coating between



THE CUTTER BRANCH CUT-OUT.

them and the back, so that the block may be safely set against a damp ceiling. The wires are readily fastened without removing any screws. Neither the main nor the branch wires need be cut, but are merely bared opposite the fastenings, and owing to the shape of the porcelain block, the main and branch wires can never touch each other. As common screws are used throughout, any lost ones can be readily replaced.

These features will commend themselves, but perhaps a still more novel one is that of a bridge covering the central portion of each fuse. The fuse is easily put in place, and when it burns out the bridge restrains the sputtering and catches the burnt metal. Thus the bridges give the effect of a cover, although fireproof, neater and cheaper. The whole is strongly made, nearly twice the size of the cut, and suited for 20 amperes or less.

Reynier Accumulators.

M. Reynier has recently exhibited some new accumulators invented by him, which he calls elastic accumulators. The plates, prepared in special manner, are corrugated and placed one against the other, separated by a padding of silica. The elements are placed in elastic receptacles, which are all compressed together. Further details are promised of this accumulator, the gross weight of which is stated as very small for the out-put.—*London Electrical Engineer.*

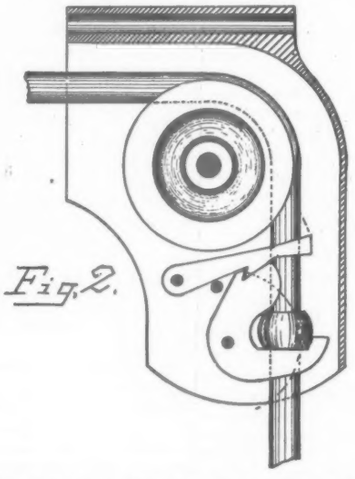


Fig. 2.

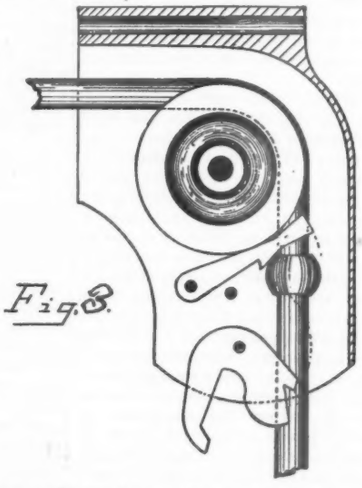


Fig. 3.

—— A central electric station proposed for the town of Düsseldorf was to have had a capacity of 10,500 lamps of 16 candle-power; but, owing to the demand, it is decided to enlarge the scheme to a capacity of 18,000 lamps, and new tenders are invited. The works are to be outside the town, on the site of the present gas works.

Electric Pumps.

A recent application of electricity is that of operating pumps by electric motors. The Gould Manufacturing Company, of Seneca Falls, N. Y., has entered this field with its usual push and energy and has brought forth a line of electric pumps which seem to fill all the requirements. Our illustrations show a front and side view of one of its latest efforts in this direction. It is a five inch diameter, eight inch stroke, geared triplex pump, actuated by a 10 horse-power electric motor mounted on a common bed plate and connected by direct engagement of gears on pumps, counter and motor armature shafts. The company makes any combination of motor and pump when furnished with the necessary data.

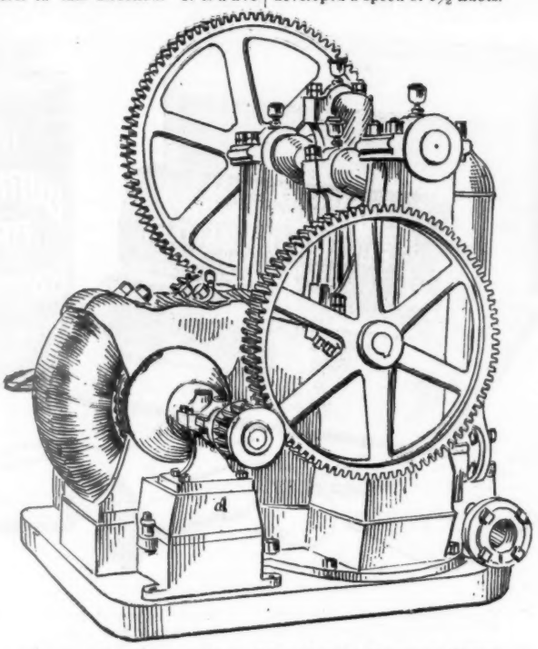


FIG. 1.—THE GOULD PUMP, OPERATED BY ELECTRIC MOTOR.

A Cure for Homesickness.

A Syracuse, N. Y., little boy was visiting some friends in this city. His parents had sent him to stay some time, but the little chap hadn't been here long before an attack of homesickness a good deal bigger than himself seized him. He wanted to go home and he wanted to see mamma worst of all. Persuasion failed to convince him that everything would be done to make him happy, so that he could finish and enjoy his visit.

As a last resort, his friends took him down to the American Telephone and Telegraph Company's office, at 18 Cortlandt street. Syracuse was called up over the long distance telephone line. His mother came to the instrument and the little fellow began a conversation with her which lasted some time. She, finally, convinced him that he must remain here, and he went back with his friends perfectly satisfied and with all traces of homesickness gone.

The electrician of the Boston *Herald* was last week elected President of the Electrical Engineers' and Mechanics' Association, of that city, and was also presented with an elegant gold badge or medal symbolical of the association. It is of solid gold, a *facsimile* of Benjamin Franklin's kite, supported by a key of the same material, which symbolizes the experiment of Franklin in drawing electricity from the clouds. On the face of the medal, which is elaborately chased, is a medallion bust of Franklin, over which are the initials of the association and underneath the name of the recipient. On the reverse side is the inscription, "Presented by members of the Association, June 26, 1890, to J. Dean, Jr." The presentation took place at Brunswick Hall on the occasion of the semi-annual election of the society, and other officers were chosen as follows: Vice-president, M. Daley; financial secretary, George Newman; corresponding secretary, Eugene McCarthy; recording secretary, Frank Johnson; treasurer, A. Hanson; conductor, N. Olson; chaplain, G. McCaughey; inside guard, Louis Hoffman; outside guard, B. Smith; trustees, J. Jordan, F. Whipple and B. Toner.

An Electric Launch.

A new launch, propelled by an electric motor, the invention of Daniel Regan, made on the bay at San Francisco, a trial trip, which seemed to be quite a success. The inventor and Livingston L. Baker and two other gentlemen, who are interested in the invention, were on board and were greatly pleased at the results attained. The launch developed a speed of 9½ knots.

Ogden Iron Mines.

In July, the old Ogden iron mines, situated in Orange and Rockland Counties, N. Y., and Sussex and Warren Counties, N. J., will be re-opened. The company which will operate the mines is called the New Jersey and Pennsylvania Concentrating Company, and will install a Thomas A. Edison magnetic ore separating plant.

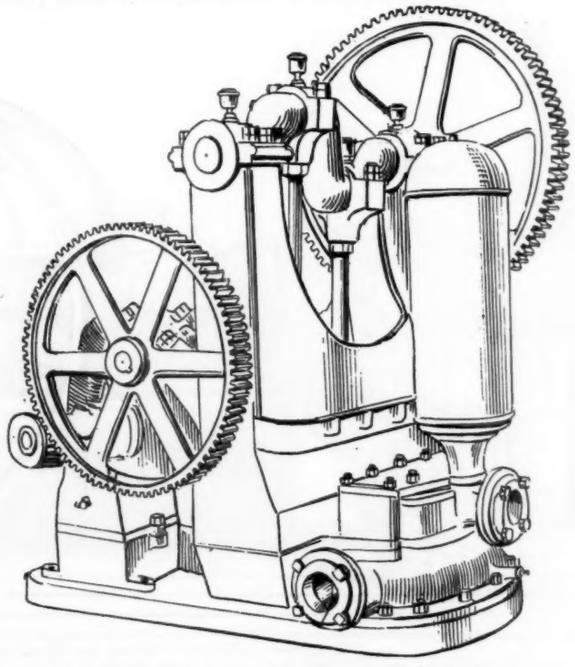


FIG. 2.—THE GOULD PUMP, OPERATED BY ELECTRIC MOTOR.

—— Pittsburgh need fear no rivalry from New York in the matter of street illumination, and we will continue to deserve the praise as the best lighted city in the world. The electric lighting combine made the figures too steep for Gotham to stand, and the prospect now is that a return will be made to gas for street illumination.—*Pittsburgh Chronicle.*

Catalepsy from Lightning Shock.

Celia Williams, a young lady of 18 years, came from her home in Omaha to visit in Council Bluffs, Iowa. She was prevented from returning home by the severe electrical storm. While the storm was at its worst she complained of feeling drowsy, and shortly afterward fell into a deep sleep, from which she has not awakened. Physicians have been working with her for the last two days, but have been unable to arouse her from the cataleptic fit. Her physical condition is normal, and she lies with her lips slightly apart, as if only enjoying natural sleep. It is reported that two years ago she lived three weeks in unconsciousness in a cataleptic fit.

The Master Mechanics Interested in Electric Work.

There was an important item brought up for consideration at the Master Mechanics' Convention, held at Old Point Comfort, June 17-20, by Mr. J. N. Barr of the Milwaukee and St. Paul Railway. The substance of the resolution he presented for the committee on subjects to consider, was as follows: "In view of the fact that electricity is taking such an active form in welding, signaling, motive power, switching, lighting, etc., and in order that the master mechanics may be abreast of modern thought and invention, I move that the committee on subjects take into consideration the idea presented and report progress at the next Convention."

This movement will be hailed with pleasure by workers in the electrical world and it signifies that the epoch of automatic appliances is fast dying out, that the wonders which have been worked in electricity have opened the eyes of even those who are trained in mechanical work only.

—— The largest electric light plant in the Lake Superior country, capable of illuminating half a dozen mines, as well as the city of Bessemer, was begun at Bessemer, Minn., last week. It will cost $75,000.

—— A portion of the old Erie City Iron Works moulding room, at Twelfth and French streets, Erie, Pa., is being torn down. The Erie County Light Company will expend about $20,000 in converting the place into an electric light plant.

—— Some 3,000 hands are working day and night at the factory of the Thomson-Houston Company, and the company never was busier than to-day. It is said that net earnings for first three months of 1890 show 100 per cent. increase over the corresponding period last year. When the Thomson-Houston preferred stock is all issued, fixed charges will be only $350,000 per annum.

ELECTRIC LIGHT NEWS

—— The gas pipe that feeds a lamp post at 127th street and Madison avenue, burst one night last week and the gas burned merrily from 10 o'clock to 1 A. M.

—— The offer of the Brush Electric Light Company, to illuminate Baltimore for five years at the rate of 35 cents per light, has been accepted by the city authorities.

—— It has been found necessary to remove the globes from the electric lights in Peoria, Ill. They become filled with June bugs to such an extent as to separate the carbon points and extinguish the light.

—— The Dayton, O., Electric Light Company, are tearing out their present system of electric lamps, with which the city is at present lighted, and is putting in the Thomson-Houston. The change involves an expenditure of about $40,000.

—— The St. Louis Board of Public Improvements has ordered 183 additional arc lights for the district west of Grand avenue and north of Washington avenue, and 50 for the territory bounded by the river on the east and north, Washington avenue on the south and Grand avenue on the west. These will be erected by the Municipal Electric Lighting Company.

—— Mr. E. Yates Henkle, aged 31 years, a son of ex-Congressman Eli J. Henkle, and a well-known Baltimore electrician, died Saturday at Middlesborough, Ky., after an illness of several weeks. For some years he had been in the employ of the Wenstrom Electrical Company, of Baltimore, but left six months ago for Middlesborough, where he took charge of an electrical plant in that city.

—— The *Chronicle* claims to have been the pioneer advocate of electric lighting in St. Louis, and it, therefore, takes no little pride in the showing of the comptroller that $67,338.61 will be saved the first year by the employment of the new system. The improvement in the lighting calls for no official report. It is seen by everybody. Not only is the city much better lighted, but it is lighted every night in the year.

The Thomson-Houston International Electric Company is doing remarkably well, and $250 is bid for the common stock. The annual meeting of the company occurs at Portland, Me., and these directors will be chosen, all from Lynn, except Messrs. Ames and Davenport, of Boston, and containing some changes from the old board: C. H. Newhall, J. N. Smith, B. F. Spinney, Oliver Ames, J. S. Bartlett, F. S. Pevear and G. W. Davenport.

—— The Quincy Electric Light and Power Company, of Quincy, Mass., held its annual meeting last week and elected the following officers: President, William G. A. Pattee; vice-president, William B. White; directors, John R. Graham, Abner B. Packard, John Cashman, John Quincy Adams, James H. Stetson; treasurer, Horace F. Spear; clerk, Walter M. Packard. The financial exhibit disclosed the following facts: Gross income, $17,174.02; net income, after paying all interest, $2,827.06. This amount will pay an income of six per cent., which will probably be declared in a few days.

—— It is probable that the plant of the Detroit Electrical Accumulator Company will soon be for sale. The Brush Company has not bought it, as has been stated, nor has it any intention of doing so. The immediate cause of retiring is the failure of the company to secure a renewal of its contract with Geo. H. Gies & Company. The Brush Company, learning that the Accumulator Company could not hold out much longer, obtained the consent of its officers to contract with its customers for the ensuing year. In fact, the Brush Company has been furnishing light to the customers of the Accumulator Company for some time.

Telegraphers of Old.

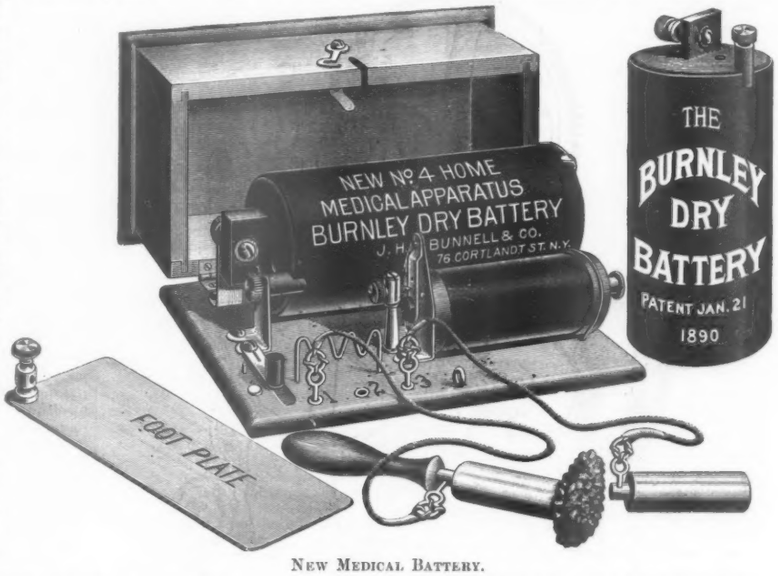
TWO VETERAN SOCIETIES TO MEET IN KANSAS CITY, IN SEPTEMBER.

During the second week of next September, there will meet in Kansas City, Mo., an association of which but little is known in this country by the people in general, but to whom the country owes, in a large measure, its prosperous condition to-day. It will be the tenth annual joint convention of the Old Time Telegraphers' Society and the Society of the United States Military Telegraph Corps. The former of these two associations is composed of veteran telegraph operators who sat by the ticker when the art of talking over the wire was in its infancy. The latter organization is made up exclusively of the men who served in the government telegraph service during the war. Although the two are distinct societies, they always meet together, as the members of the old timers, are, in the main, also members of the military corps. The meeting last year was held in Louisville, and the 450 who attended were royally entertained by the old veterans of the Falls city.

There are only four regularly organized branches of the military corps and they are located in Washington, D. C., Kansas City, Omaha and Denver. The first named of these had 14 members at the last meeting, Kansas City had 22, Omaha 14, and Denver 13. Several members have been added to each since then. Beside these there are several hundred members scattered all over the country, from Maine to California. The local branch was organized in January, 1883, and year by year, members have been added. The officers of this branch are: Day K. Smith, president; J. D. Cruise, vice-president, and D. A. Williams, secretary and treasurer. Mr. Smith also has the honor of being President of the National Old Time Telegraphers' Society. Barney Hughes, of Memphis, is vice-president, and W. J. Dealy, of New York, secretary and treasurer. The officers of the National Society of the United States Military Telegraph Corps are: W. R. Plum, of Chicago, president; William B. Wilson, Holmesburg, Pa., vice-president, and J. E. Pettit, Chicago, secretary and treasurer.

The military corps has for the past few years been making an effort to have Congress in some way recognize its service during the war. The idea has gained prevalence that the object of this is to secure pensions, but it is erroneous. There are no records on file in Washington which go to show that Congress has ever done anything in the way of complimentary recognition of the valuable services of the war time telegraph operators. Several bills have been introduced at various times in the lower House but they have eventually been lost sight of. Major Warner, of Kansas City, has been a valuable friend to the corps and during his congressional career made several earnest pleas in its behalf. The national committee appointed at the last convention to look after this congressional recognition is composed of W. J. Dealey, chairman, New York; E. Rosewater, Omaha; W. B. Wilson, Holmesburg, Pa; J. H. Emerick, New York; L. C. Weir, Cincinnati, O.

The local branch is putting forth every effort to entertain their guests in Kansas City, says the *Star*, in a befitting manner in the Fall, and, if at all possible, out-do the handsome hospitality of the Louisville veterans last September. An excursion to Excelsior Springs has been arranged, and a banquet at "The Elms," on the evening of that day. One of the theatres will be used as a convention hall, and rates with the hotels made. Fully 400, and may be 500, will attend. There are no delegates, but everybody comes, and many bring their families with them. It is hoped to raise $1,000 as an entertainment fund, and a part of this sum has been already subscribed.



NEW MEDICAL BATTERY.

"Forty Per Cent. Saving in Fuel."

This is the claim made by the McIntosh & Seymour Engine Company. It has reference to their compound condensing type of engine, a cut of which is herewith presented to our readers. When a number of engines of smaller powers are belted direct to dynamos or generators, obviously they must be of the simplest form, require the minimum of attendance, and be capable of running at high speeds; requirements which render inadmissible the complexity which has always been considered necessary with an economical type of engine. However, the advantages of direct belting and divided power are so great that notwithstanding the lack of economy, a large majority of electric light stations have been arranged upon this plan.

The peculiar design and arrangement of the McIntosh & Seymour standard compound engines is such that every part is of the simplest possible form. They run at the highest speeds used with high pressure engines in a perfectly quiet and satisfactory manner, and require no more care or attention. The testimony of those who have these engines in use, it is stated, report a reduction of coal consumed of over 40 per cent. in actual every day service, where they have supplanted automatic cut-off high pressure engines.

These engines are not in any sense experimental. They have been running for a long period with marked success. It is a significant fact that a majority of those sold have been installed in old stations for those who have had long experience. When water for condensing purposes is not available, these engines can be furnished adapted to run non-condensing. While the saving in fuel made by these is not as great as with the condensing engines, it is well worth effecting. The coal consumption of both types will be guaranteed.

The McIntosh & Seymour standard compound engine is a horizontal tandem compound engine, with high pressure cylinder and receiver steam jacketed. This is considered the most economical type, with as high pressures as can be ordinarily carried.

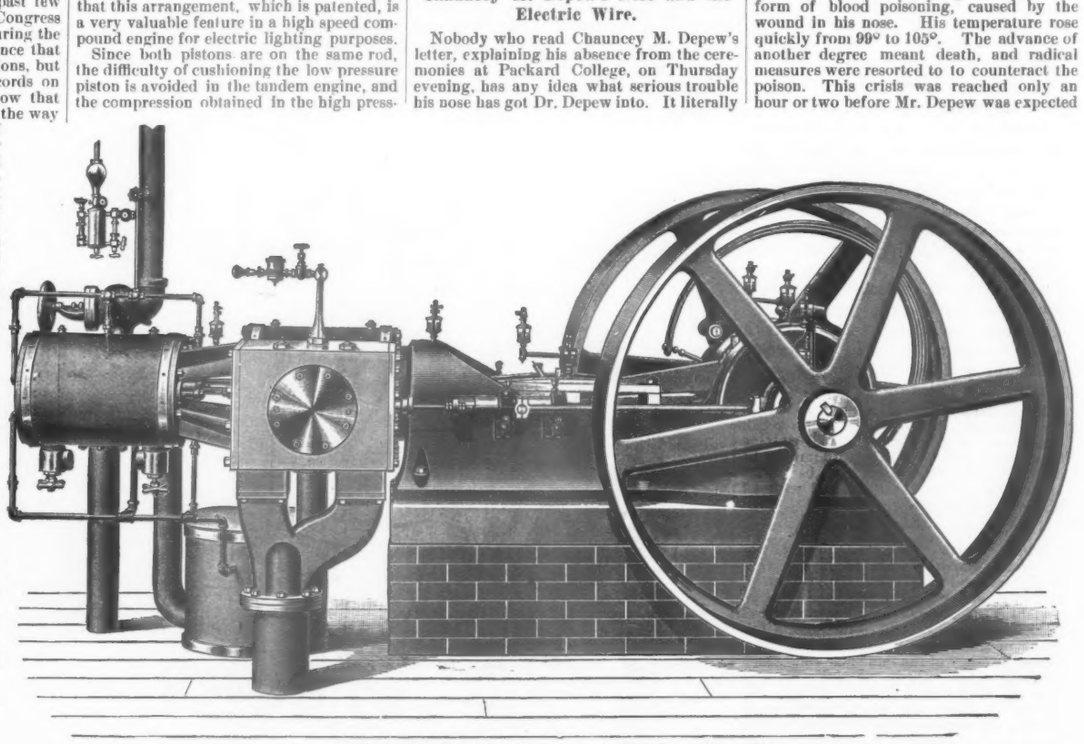
The chief peculiarity of this engine is the position of the high pressure valve together with its actuating gear upon one side of the engine and that of the low pressure upon the opposite side. This allows each valve to be driven in the most direct and simple manner, separates and makes easily accessible the moving parts, and is claimed to be the only arrangement possible with a tandem engine, which avoids a very complicated and unsatisfactory valve driving gear. It is considered that this arrangement, which is patented, is a very valuable feature in a high speed compound engine for electric lighting purposes.

Since both pistons are on the same rod, the difficulty of cushioning the low pressure piston is avoided in the tandem engine, and the compression obtained in the high pressure cylinder gives remarkable smoothness and quietness to the running of the engine.

Live steam, after passing through the jackets of the high pressure cylinder, is used to jacket the receiver. The lower temperature of the steam in the latter causes considerable condensation in its jacket, and this induces the brisk circulation through all the jackets, which is so essential to their efficiency. The water condensed is returned to the boiler.

The low pressure valve is moved by a fixed eccentric and the high pressure valve by a governor or automatic cut-off regulator. This and also the valves, frame, solid steel shaft and moving parts generally, are precisely similar to those of the McIntosh & Seymour standard high pressure engine, which have become well and favorably known. The simple, perfectly balanced piston valves are prevented from leaking by adjustable seats. The governor commends itself for its simplicity, durability and power. Without any tendency to over sensitiveness, it will regulate the speed of the engine within one per cent. for all changes of load and pressure from zero to full load.

Like the high pressure engine, the compound is of the double crank class with two over-hanging wheels, making it entirely self-contained. The workmanship and materials used throughout are simply the very best that can be obtained, and each engine is subjected to a most exhaustive test before leaving the shops.



MCINTOSH & SEYMOUR ENGINE FOR ELECTRIC LIGHTING.

Chauncey M. Depew's Nose and the Electric Wire.

Nobody who read Chauncey M. Depew's letter, explaining his absence from the ceremonies at Packard College, on Thursday evening, has any idea what serious trouble his nose has got Dr. Depew into. It literally right. It is your nose that needs attention.' 'What should be done to it?' I asked him.

"'It should be reamed out.'

"'Oh, yes; I've heard of that.' I told him: 'You take a saw and cut away a section of the bone between the nostrils so as to open the flue and facilitate breathing.' 'No, science is away ahead of that now. We just take an instrument with a small snare of platinum wire at the end which is kept heated white-hot by an electric current, and we cauterize or burn out a section of the cartilage without any difficulty or bad effects.'

"Before I knew it he had me in a chair, and had begun and soon finished his work with his white-hot platinum wire."

Mr. Depew spent the next 24 hours in the cars. The effect naturally was to inflame the open wound. The next day he was taken suddenly ill. The symptoms rapidly became aggravated and alarming. Two or three physicians were summoned. They found Mr. Depew suffering with an acute form of blood poisoning, caused by the wound in his nose. His temperature rose quickly from 99° to 105°. The advance of another degree meant death, and radical measures were resorted to to counteract the poison. This crisis was reached only an hour or two before Mr. Depew was expected to address the great audience in the Opera House. While the doctors were working to save his life, Mr. Depew astounded them by remarking that he intended to keep his appointment at any cost, and he did. The doctors did their best. They succeeded in reducing the patient's temperature to 102°, and his pulse to 105. At the close of his speech, Mr. Depew's doctors took him back to his hotel and worked over him for 24 hours before they would allow him to leave his bed to keep his second appointment at the banquet on the following evening.

KINDRED INTERESTS

The Thomson-Houston Electric Company have established an office in San Francisco, at 15 First street. This will hereafter be the supply station for this company on the Pacific coast.

The Fort Wayne Electric Company, through Mr. A. G. Greenberg, has just closed a contract with the Ilion and Mohawk Gas Light Company, Ilion, N. Y., for a 60-light, 2,000 candle-power plant, complete, of the new Wood arc system.

The Palermo Mica Company report increasing orders for all sizes of electric mica. As their mine is the only one in operation in the United States, they have an increasing trade and are in position to produce and cut all sizes for electrical purposes.

The Jones Bros. Electric Company, of Cincinnati, have a very complete and well equipped electrical establishment. They do a fine business in the making of models of new inventions. They will send a copy of their "model circular" to all who send a stamp with the request.

The Thomson-Houston Motor Company has sent us another of their handy little reference pamphlets. This one takes up and describes electric power as it is applied in printing offices, machine shops and similar places. Information and illustrations are plentiful and good.

The Expanding Brass Wire Guards introduced in the West by the Central Electric Company, and adaptable to the Sawyer-Man, Edison, Westinghouse, Thomson-Houston and Schaefer sockets, without use of shade holder, are a great protection to the lamp, especially when exposed, as in factories, warehouses, etc. These guards are increasing in popularity.

Messrs. McKenney & Waterbury, of Boston, will represent the Archer & Pancoast Manufacturing Company in the New England States, for the sale of that company's large line of gas and electric fixtures. This young firm has fitted up several of the largest and most extensive buildings in Boston, including the magnificent Shoe and Leather Exchange, with electric and gas combination fixtures.

The Electric Mutual Insurance Company, of Boston, is doing considerable business with electric railroads, writing stations, outside equipment, cars and motors, and the car houses where there is no stable attached. President Barton, who has lately returned from a Southern trip, reports a rapid growth in the number of electric stations in that section, and among them are some very nice plants.

A Home or Office on the Rails is the strange anomaly presented by the Pennsylvania Limited. Hand-maids anticipate the wants of ladies and children who are surrounded with all the home comforts, while the business man keeps pace with the times by the financial and general news bulletins, and conducts his correspondence through the medium of free type-writers. The Limited leaves New York daily, from stations foot of Desbrosses and Cortlandt streets, at 10 A.M., for Chicago and Cincinnati.

The Evans Friction Cone Company have had their system of transmission of power in use for four years driving all classes of machinery. The first application of the system to the running of dynamos was made just one year ago. There are now 50 dynamos and railroad generators running by the system, varying from 10 to 80 horse-power, in 23 different stations, all giving perfect satisfaction, and there are in process of erection plants for the use of the system aggregating 1,200 horse-power, and at the present rate of increase, this amount will be over 5,000 horse-power early in July.

Views of Providence, R. I.

Messrs. Armington & Sims, the widely known engine builders, of Providence, have kindly remembered the REVIEW with an album of beautiful views of the city of Providence, R. I. An attractive view of the immense factories of the engine company appear on the first page, and is followed by a number of other interesting views of leading establishments and points of interest of Providence, including the State House, Haywood fountain, the extensive American Electrical Works, Narragansett Hotel, Arsenal, Brown & Sharpe, Doyle monument, and many views. The collection is an interesting and handsome one, very prettily bound.

A Valuable Figure.

A wrong figure in a despatch has resulted in a suit against the Western Union Telegraph Company. The plaintiffs are Griffith Coit, W. T. Barton and W. N. Cowles. In February last they sent a despatch to W. B. Dennis, St. Louis, inquiring the cost of 40-pound steel rails a ton. They replied they were $37 a ton. The intelligent operator made the despatch read $27 a ton. The plaintiffs then contracted to supply the California Lumber Company 220 tons of 40-pouud steel rails at $27 a ton, plus the freight charges, and ordered that amount from Dennis. Before the discovery of the error the plaintiffs became bound by their contract. They suffered damage in the sum of $5,000, and they have sued to recover judgment for that amount.

WASHINGTON CARDS OF INTEREST TO ELECTRICAL MEN.

The Columbia National Bank,
911 F STREET, N. W.,
WASHINGTON, D. C.
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E. S. PARKER, *Cashier.*

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LOANS MONEY on COLLATERAL and REAL ESTATE.
Pays Interest on Deposits. Has for sale Secured Investments.
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CALL AND SEE OR WRITE TO US.
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JNO. JOY EDSON, *V.-Prest.* W. B. GUALEY, *Act'g Treas.*

INVENTORS
Coming to Washington to further any electrical patents, will profit by calling on **C. W. Messner, of 1225 F St., N. W.** All the appliances necessary for tests, experiments, etc. Also, Electrical Contractor and Constructor. Special attention to isolated plants. Agent for the "C. & C." electric motor—sizes, ⅛ to 50 horse-power. The only electric motor on the market to-day.

Washington Electric Conduit Co.,
Room 36, Corcoran Building,
Washington, D. C.
Manufacturers and constructors of glazed Terra Cotta conduits for electric wires of all descriptions. Approved by the engineers of the District of Columbia and local companies. Can be examined by interested parties.

WANTED.—ELECTRIC LIGHT SALESMEN to travel in New England States. None but first-class men with experience need apply.
Address, giving reference and experience, with salary expected,
"A,"
Care of ELECTRICAL REVIEW,
13 Park Row, New York.

THE POPE ELECTRIC CLOCK CO.,
94 and 96 Nassau Street, N. Y.
This Company is prepared to supply *Electric Clocks* at about the same price as an ordinary regulator. No winding whatever. Only one cell of battery required. Expense to run, about 25 cents a year. Each clock complete in itself.

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON JULY 1, 1890.

431,035 Electric cut-out; Leo Daft, Plainfield, N. J.
431,038 Ceiling-block connector for incandescent lamps; Louis W. Dillon, North Attleboro, Mass., assignor of one-half to Homer M. Daggett, Attleboro, Mass.
431,073 Electric battery; Myron W. Parrish, Detroit, Mich., assignor, by mesne assignments, to Junius A. Bowden and the Graphite Electric Company, same place, and John Hutchinson, Jackson, Mich.
431,088 Individual call devices for telephones; Charles H. Vincent, Lynn, Mass., assignor to Frederick W. A. Bergeugren, same place, and John V. Spaulding, Boston, Mass.
431,092 431,093 431,095 System of electric locomotion. 431,094 Switches for electric railway systems; Frank Wheeler, Meriden, Conn.
431,104 Protective covering for electric cables; John H. Cheever, New York, N. Y., assignor to the Okonite Company, same place.
431,118 Electric switch; Osborn P. Loomis, Somerville, Mass., assignor to the Loomis Electric Manufacturing Company, New York, N. Y.
431,134 Dynamo electric machine; Charles F. Winkler, Troy, N. Y.
431,141 Electrical call-box; Geo. F. Gale, Winthrop, Mass., assignor of one-half to Arnold B. Holmes, Boston, Mass.
431,170 Electro magnetic drill system; Harry N. Marvin, Syracuse, N. Y., assignor to the Marvin Electric Drill Company, same place.
431,181 Electric bell; Patrick B. Delaney, South Orange, N. J.
431,185 431,186 Multiple fusible cut-out; Lorenzo B. Favor, Bridgeport, Conn., assignor to the Thermal Electric Company, of Maine.
431,213 Electric motor for railway cars; William M. McDougall, East Orange, N. J.
431,216 Regulation of dynamo electric machines. 431,217 Self regulating dynamo electric generator. 431,218 Self exciting alternating current electric generator; Wm. Stanley, Jr., Great Barrington, Mass.
431,235 Dynamo electric machine; Oliver B. Shallenberger, Rochester, N. Y., assignor to the Westinghouse Electric Company, Pittsburgh, Pa.
431,239 Electric mining machine; John M. Walter, Peoria, Ill.
431,248 Electric meter; Jules Cauderay, Paris, France.
431,256 Suspended electric railway and car; Frederick E. Drown, Pawtucket, R. I.
431,280 Machine for perforating strips for use in automatic type setting apparatus; John B. Odell, Chicago, Ill., assignor of two-thirds to Horatio N. May and Nathaniel S. Jones, both of same place.
431,330 Electric lamp fixture; Sigmund Bergmann, New York, N. Y.
431,341 Secondary battery; Theodore M. Foote, Allston, assignor of one-half to Charles J. Pillsbury, Boston, Mass.
431,408 Electric railway signal apparatus; Wm. Snee, Pittsburgh, Pa., assignor of seven-eighths to John A. Snee and Anson P. Norton, same place.
431,412 Electric connector; Hermann Studle, Dom Kruk, near Inowraclaw, Prussia, Germany.
431,414 Electric railway conductor; Elihu Thomson, Lynn, Mass.
431,439 Electric soldering iron; Chas. L. Coffin, Detroit, Mich.
431,447 Secondary battery; Theron S. E. Dixon, Chicago, Ill.
431,482 System of distribution for electric railways; Elias E. Ries, Baltimore, Md., assignor to Ries & Henderson, same place.
431,492 431,493 431,495 Reciprocating electric engine. 431,494 431,496 Reciprocating electric engine system; Charles J. Van Depoele, Lynn, Mass.
431,516 Automatic cut-out; Alvin S. Haines, Pittsburgh, Pa., and James H. Curry, Wilkinsburg, assignors of one-eighth to Walter A. Rose, Rochester, and Marshall D. McWhinney, Wilkinsburg, Pa.
431,519 Electric railway; Rudolph M. Hunter, Philadelphia, Pa., assignor to the Thomson-Houston Electric Company, of Connecticut.
431,531 Telephone signal apparatus; John A. Seely, Brooklyn, N. Y., assignor to the Western Electric Company, Chicago, Ill.

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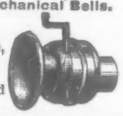

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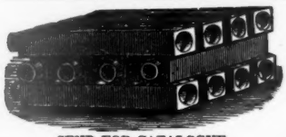
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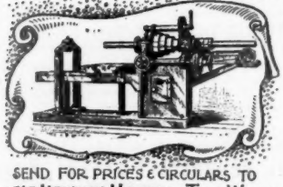
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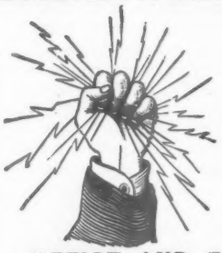
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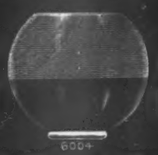
GLOBES  **SHADES**
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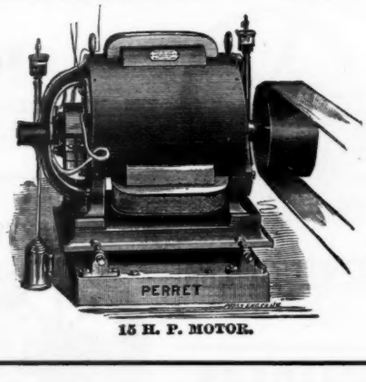

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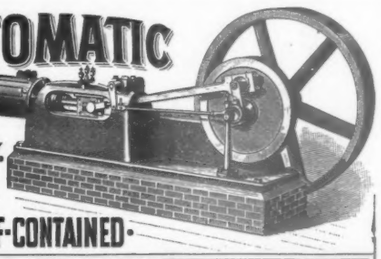

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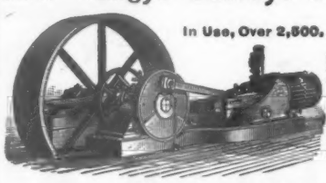

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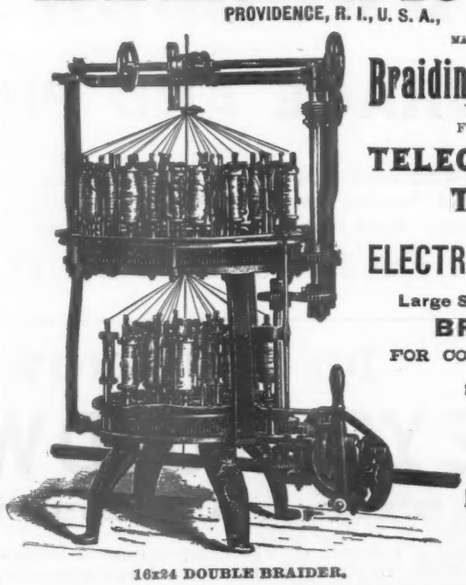

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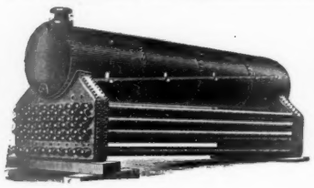

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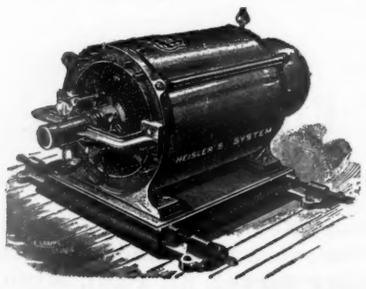

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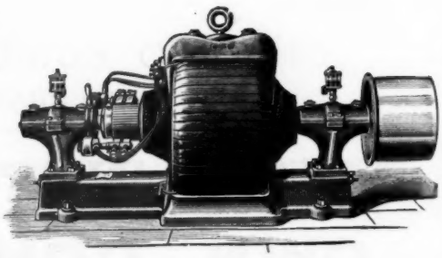

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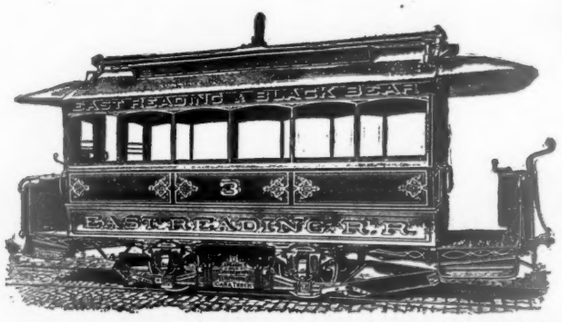

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LIST OF DYNAMOS IN STOCK.

Designation of Machine.	No. Lights 2,000 c. p. 10 amp. X	No. Lights 1,600 c. p. 8 amp. Y	No. Lights 1,300 c. p. 6 amp. Z	No. Lights 800 c. p. 4 amp.	Horse-Power at Pulley of Dynamo.	Width of Single Belt in inches.	Belt Speed Required.	Weight of Dynamo.
C	8	.....	.....	.....	6.5	1¼	5,000 FEET PER MINUTE.	530
D	.....	10	.....	.....	6.3	1½		530
E	.....	.....	.....	25	8.0	2		530
F	16	.....	.....	.....	12.0	2½		780
G	.....	20	.....	.....	12.5	2½		780
H	.....	.....	26	.....	13.0	2½		780
I	20	.....	.....	.....	15.0	3		990
J	.....	25	.....	.....	15.6	3		990
K	.....	.....	32	.....	15.0	3		990
L	.....	.....	.....	50	16.0	3		990
M	28	.....	.....	.....	21.0	4½		1,360

Ball Electric Light Co., 18 CORTLANDT ST. NEW YORK

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Designation of Machine.	No. Lights 2,000 c. p. 10 amp. X	No. Lights 1,600 c. p. 8 amp. Y	No. Lights 1,300 c. p. 6 amp. Z	No. Lights 800 c. p. 4 amp.	Horse-Power at Pulley of Dynamo.	Width of Single Belt in inches.	Belt Speed Required.	Weight of Dynamo.
C	.....	35	.....	.....	21.0	4	5,000 FEET PER MINUTE.	1,360
D	.....	.....	45	.....	21.0	4		1,360
E	.....	.....	.....	70	21.0	4½		1,360
F	40	.....	.....	.....	29.7	6		1,750
G	.....	50	.....	.....	30.0	6		1,750
H	.....	.....	64	.....	29.5	6		1,750
I	52	.....	.....	.....	38.0	8		2,290
J	.....	65	.....	.....	38.6	8		2,290
K	.....	.....	83	.....	38.0	8		2,290
L	64	.....	.....	.....	46.5	10		2,770
M	.....	80	.....	.....	47.1	10		2,770
N	76	.....	.....	.....	52.5	12		3,300

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PROCEEDINGS OF THE

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This matter has been placed in charge of the

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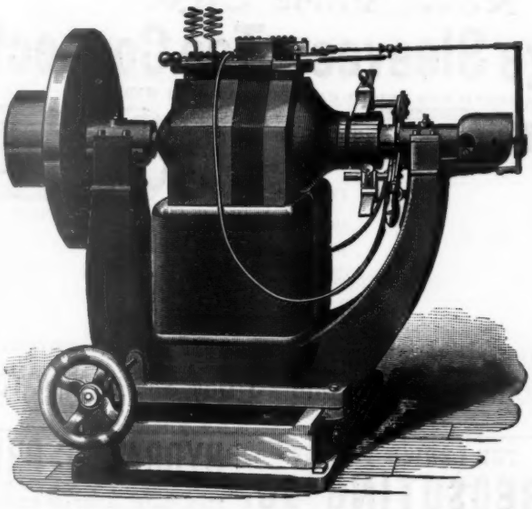

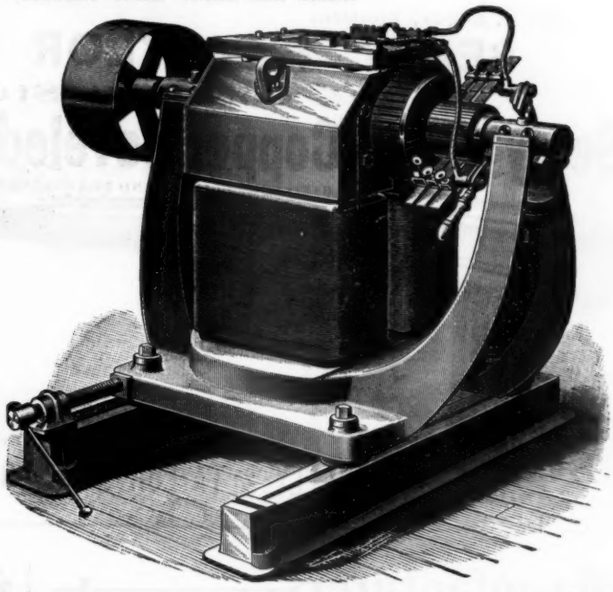

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FIG. 1.

Fig. 1 represents Copper Tee used for branching from main cables, as shown in Fig. 2.

FIG. 2.

Fig. 3 represents a Copper Sleeve used for straight connections for continuation of cables.

FIG. 3.

These sleeves are bevel edged, thereby preventing abrasion of insulation when placed over same.

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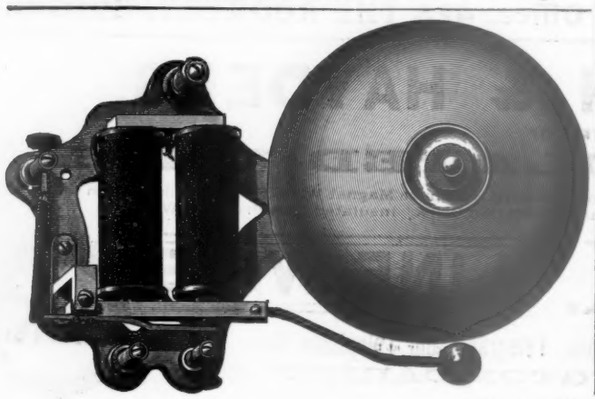

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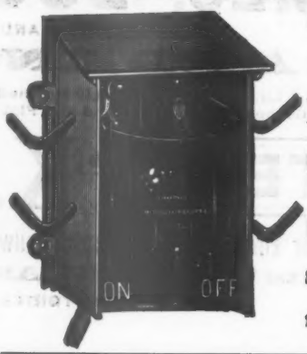

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55 KILBY ST., Room 63,
BOSTON, April 21, 1890.

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(Signed) OSBORNE HOWES, Jr., Secretary.

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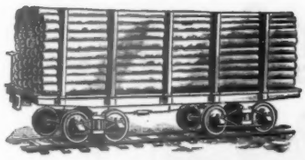

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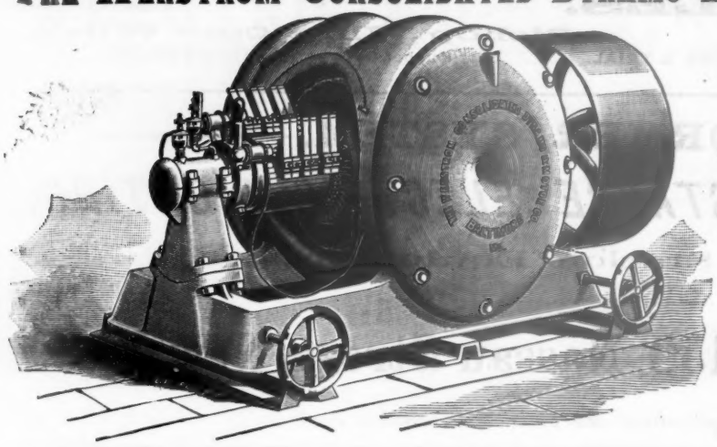

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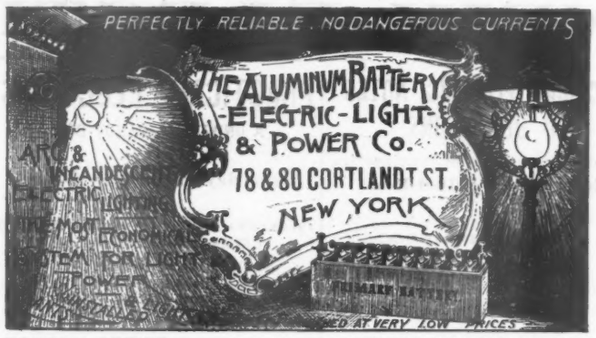

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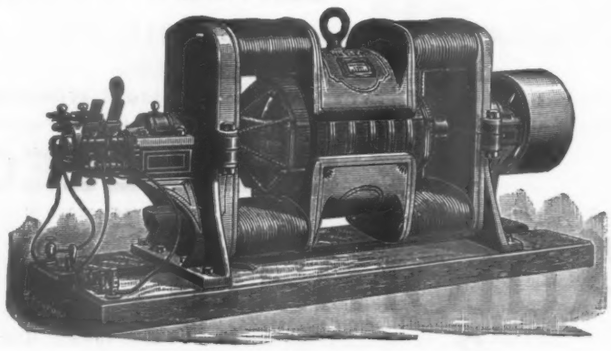

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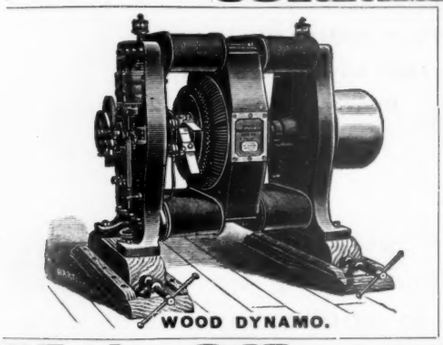

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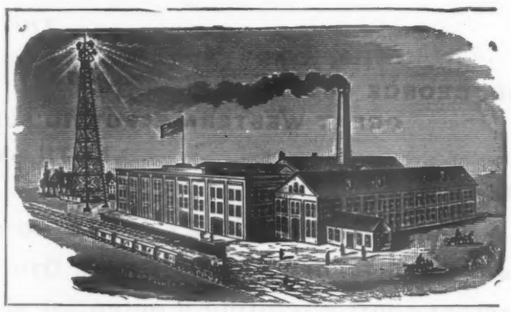

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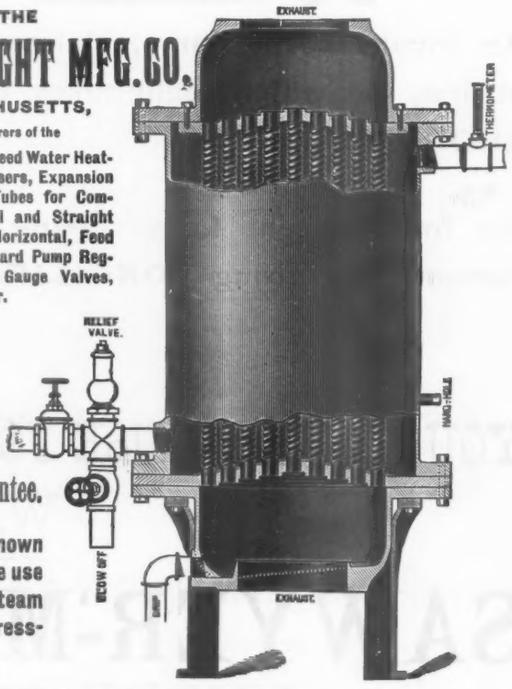

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